CAMBRIDGE SYSTEMATICS

Regional Landside Access Study for Maryland's Port of Baltimore

final

report

prepared for

Maryland Department of Transportation

prepared by

Cambridge Systematics, Inc.

and

Sabra-Wang Associates, Inc.

February 17, 2006

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Executive Summary

About This Report

The Maryland Department of Transportation (MDOT) Office of Planning and Capital Programming, in consultation with a team led by Cambridge Systematics Inc. (CS) has prepared the *Regional Landside Access Study for Maryland's Port of Baltimore*. The study was guided by a Management Team of public agencies and an Advisory Committee of public and private stakeholders.

The purpose of the study was to document current and future transportation conditions over a 20-year timeframe and identify strategies to benefit access and mobility for Maryland's Port of Baltimore and related industries. This includes both public and private marine terminals in the Port of Baltimore. The study focused on landside access issues, and did not address marine terminal operations or "inside the gate" port activities.

Study Vision and Goals

The study was guided by a Project Management Team (comprised of public agencies) and an Advisory Team (comprised of public and private sector stakeholders). These two groups guided the formation of the following vision and goals for the study. The following vision statement was formulated:

> ***Seaports, highways, railroads, airports, and transit systems are vital in transporting raw materials, finished goods, and people to, from and within the State of Maryland. This multi-modal transportation network establishes Maryland's Port of Baltimore as one of the nation's leading seaports. Maryland's Port of Baltimore, in turn, supports Maryland's economy and role as an international gateway. Preserving and enhancing the landside transportation system that provides Maryland's Port of Baltimore with highway and rail connections to its customers and markets is essential, not only for the efficient operation and future growth of the Port, but also for the businesses and employees that depend on the Port.***

Subordinate to this vision, the following goals were formulated:

- <u>System Preservation</u>. *Promote system preservation and good stewardship of transportation assets.*

- *Connectors and Corridors. Identify, preserve, and implement critical freight access connectors and corridors at the local, regional, State, and multi-state levels.*

- *Customer Choice. Promote efficient, cost-effective transportation options for freight shippers and receivers.*

- *System Performance. Preserve and enhance transportation service speed, safety, reliability, and security for freight movement.*

- *Good Neighbor Practices. Help freight be a "good neighbor" to adjacent land uses and reduce conflicts between freight and others.*

Maryland's Port of Baltimore

In 2003, more than 40 million tons of cargo – representing almost $26 billion in value – passed through the Port of Baltimore. The Port ranked eighth in the United States and fourth on the Atlantic coast in terms of value. For overall tonnage, the Port of Baltimore ranked third among Atlantic Coast ports.

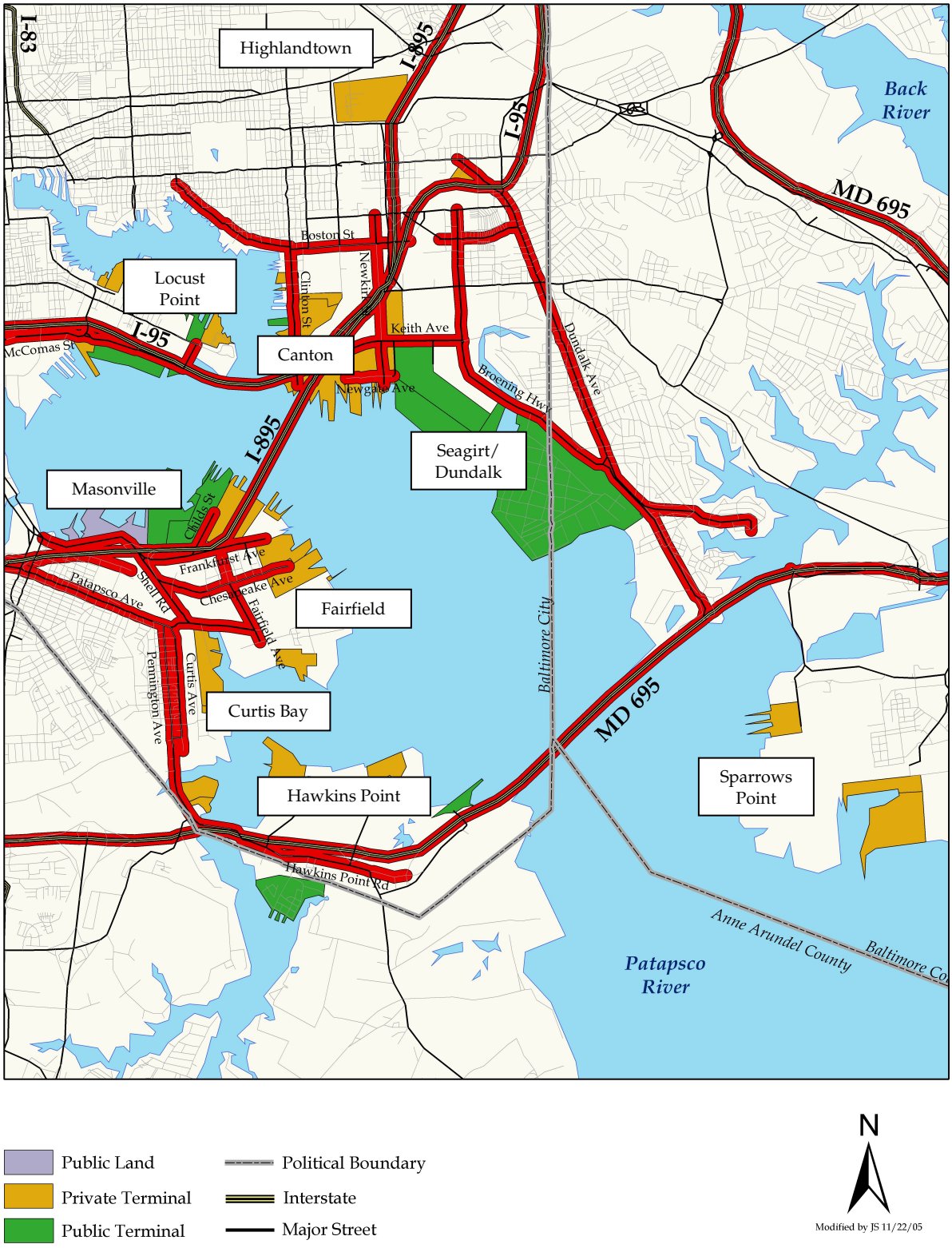
Maryland's Port of Baltimore is a vitally important source of economic activity for the State of Maryland and the entire Mid-Atlantic region. Foreign and domestic shipping activity at the Port supports over 41,200 Maryland jobs – 18,300 direct, 9,500 induced, and 13,500 indirect. In 2004, Port activity was responsible for $2.4 billion in wage and salary income, $1.9 billion in business revenues, $270 million in State and local taxes, and $507 million in U.S. Customs receipts.

The Port has natural advantages that have contributed to its historic importance. Due to its inland location, the Port of Baltimore is closer to the population and manufacturing centers of the mid-west than any other Atlantic port. Thirty-five percent of the United States' manufacturing base and 32% of its population can be reached overnight by truck from the Port of Baltimore. Providing superior landside access offers an important competitive advantage for serving current local markets – particularly Baltimore, Washington, and the rapidly-growing southeastern PA warehouse/distribution cluster – as well as supporting growth opportunities in more distant markets.

The Port of Baltimore's forty-nine public and private terminals and facilities are situated around the headwaters of the Patapsco River. Forty-three are located entirely within Baltimore City, four are within Baltimore County, one straddles Baltimore City and Baltimore County, and one is within Anne Arundel County.

These geographically dispersed facilities are served by a network of interstate, state, and local roads, as illustrated in Figure ES-1 on the following page.

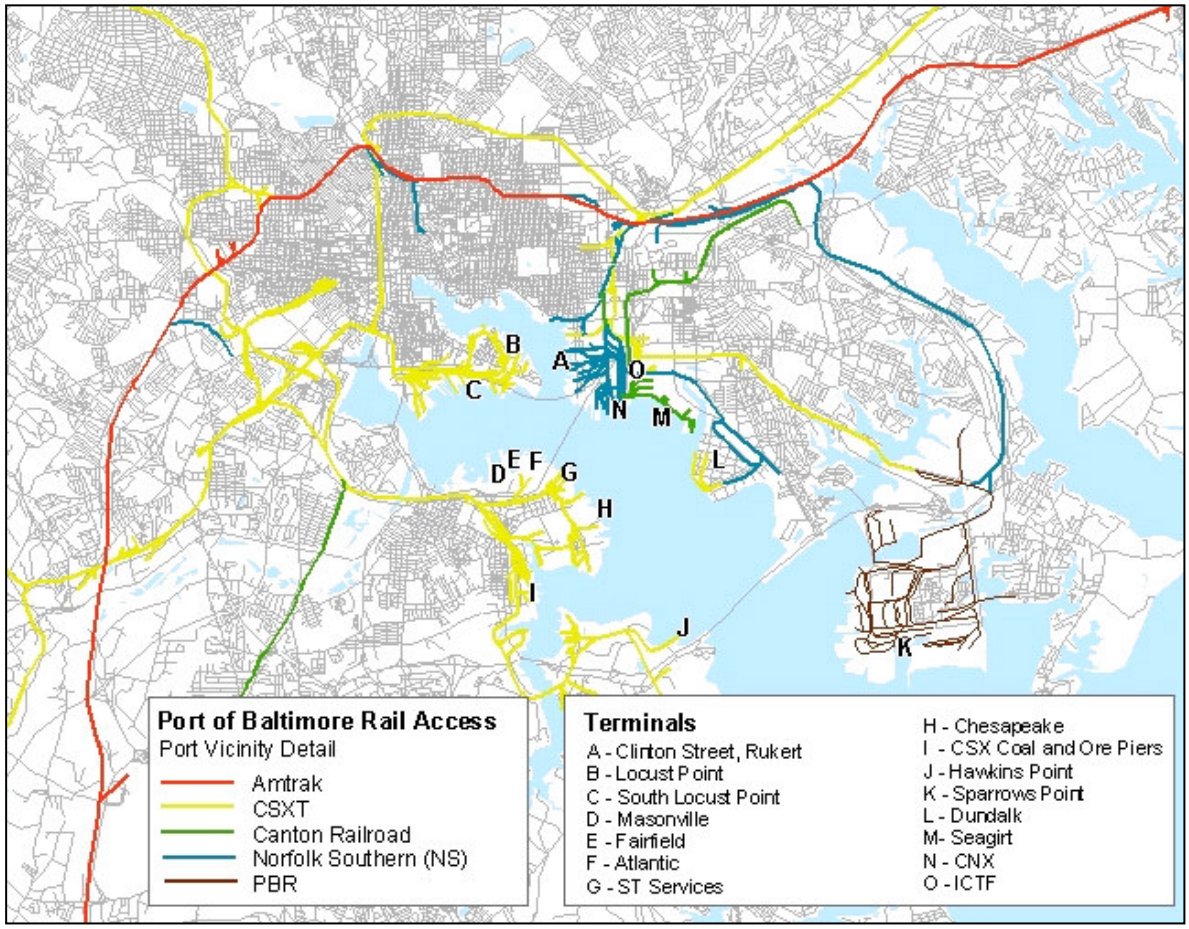
Figure ES-1. Major Truck Access to Port of Baltimore Terminals



The Port of Baltimore is served by two Class I[1] carriers, CSX (comprising CSX Transportation and CSX Intermodal) and Norfolk Southern Railway (NS). The Port is also served by the Canton Railroad, a Class III railroad and the Patapsco & Back Rivers Railroad, a switching railroad principally serving the Sparrows Point complex. Within the Port, CSX and NS provide on-dock rail service to all the State-owned terminals and most private terminals, directly or through haulage agreements with the Canton Railroad.

Figure ES-2 below illustrates the regional rail network that feeds the Port of Baltimore. CSX serves the Port with routes from the Midwest, Northeast, and Southeast states. NS provides a similar level of service to the Port through trackage rights that allow its trains to run over CSX and Amtrak's Northeast Corridor. MARC commuter trains pay for use of Amtrak and CSX tracks in this area.

Figure ES-2. Rail System Serving Port of Baltimore Terminals



[1] Freight Railroads are classified by the Surface Transportation Board (STB) by annual revenue. Class I railroads have revenues exceeding $277 million; Class II between $20 and $277 million; and Class III up to $20 million. Class I railroads are major interstate carriers. Class II's are usually regional railroads and Class III's are usually considered short lines.

Transportation Investments Benefiting the Port of Baltimore

Local and regional highway improvements that will improve access to Maryland's Port of Baltimore have been programmed by a variety of agencies, including the City of Baltimore, the Baltimore Regional Transportation Board, and the Maryland Department of Transportation. Funding is being provided from local, regional, state, and federal sources; collectively these projects represent an investment of more than $25 billion dollars over the next 25 years to improve the region's critical highway infrastructure.

Local transportation improvements are identified in Baltimore City's Capital Improvement Program (CIP) and the Baltimore Regional Transportation Board's (BRTB) transportation improvement program (TIP); many (not all) are included in both programs. Projects significant to the Port area consist primarily of capacity enhancement, bridge repairs, and pavement rehabilitation.

Regional transportation improvements are identified in Baltimore Regional Transportation Board's (BRTB) long-range transportation plan (Transportation 2030). A parallel planning process is conducted every three years by MDOT to develop the Maryland Transportation Plan which is the Department's guiding policy document. MDOT's Consolidated Transportation Program (CTP) is a transportation capital budget document that lists and describes the transportation improvement projects where State money will be spent within the next six years.

Most of nation's rail infrastructure is privately owned, by for profit transportation companies. The same is true in Baltimore. These companies are responsible for developing and serving markets, and for modifying (expanding or contracting) their systems to meet business objectives, and for keeping their assets in a state of good repair. However, the public sector is increasingly looking to play an active role in facilitating major rail system improvements that meet specified public benefit objectives, such as safety, security, economic growth, and highway congestion relief. One innovative program with substantial benefit is the Mid-Atlantic Rail Operations Study, or MAROps. MAROps was developed by the State of Maryland in cooperation with four other states (New Jersey, Pennsylvania, Delaware and Virginia), three railroads (NS, CSX, and Amtrak), the I-95 Corridor Coalition, and the Federal Railroad Administration. Together, the MAROps partners identified a program for $6.2 billion in rail system improvements to be implemented over 20 years in the five-state study area. Other studies are exploring Baltimore rail corridor issues and alternatives.

Growth and Land Use Plans Affecting the Port of Baltimore

Emerging landside access needs for the Port of Baltimore will be determined in large part by development plans over the next 20 years. Key issues and objectives for the Port of

Baltimore were defined in the Maryland Port Administration's *Strategic Plan 2002*. The overall vision was defined as follows:

> ***"To remain a major catalyst in the growth of international trade, competitive or dominant in all international cargo flows through East Coast ports, sustained by strong public and private sectors, while being good stewards of Maryland's natural environment."***

Port of Baltimore growth will lead to intensification of existing marine terminal uses and possibly to the expansion or relocation of marine terminal uses, with correspondingly increased needs for landside access. The MPA provided a cargo forecast for use in this study. Annual growth in tonnage is projected at between 3.0% and 4.0% annually for all commodity types.

The marine terminals comprising the Port of Baltimore are located in many different neighborhoods, each with its own development history and emerging development future. Truck and rail access to the marine terminals may, in some cases, be substantially affected by growth in non-marine terminal related traffic. Conversely, the ability to realize the highest and best land development futures in some neighborhoods may depend on the careful management of marine terminal truck and rail access. Finally, the ability to expand the capacity and operations of Port of Baltimore marine terminals to meet future market demand will depend in large part on how its land use and access needs are met within the larger overall land use context.

The public and private marine terminals and port and non-port related industrial lands in and adjacent to Port of Baltimore facilities typically fall within the Port Land Use Development Zone (PLUDZ). This designation was chartered by a 1998 State law and was directed by the Port Land Use Development Advisory Council (PLUDAC) which concluded its work in Fall, 2005. The Zone encompasses land three-thousand feet inland from selected waterfront areas in Anne Arundel and Baltimore counties and the entire shoreline of the City of Baltimore. Within the Zone, there are several Port Focus Areas. Each offers a characteristic set of land use issues, constraints, and opportunities for future growth.

Current System Performance

Based on various level of service analysis methodologies, and taking into account the effect of planned and programmed improvements, only one intersection in the local road system serving Maryland's Port of Baltimore will be operating above capacity in the near term. This is excellent performance from a capacity standpoint.

As part of the Baltimore Regional Transportation Board (BRTB) Transportation 2030 report, aerial images from year 2002 were analyzed to develop estimates of travel speed. According to this analysis, segments of I-83, I-695, and other roads show average travel speeds of less than 30 miles per hour, but the majority of the system offers higher travel

speeds. Model output from the BRTB regional transportation model identifies a significant number of regional interstate segments (I-95, I-695, MD 295, I-795) where estimated demand exceeds estimated capacity for at least one hour per day. Regional congestion has been the focus of major ongoing planning efforts at the City, regional, and State levels, and major improvements are under construction or planned to address congested segments.

To develop a better understanding of truck activity directly associated with Maryland's Port of Baltimore, weekday traffic counts (machine and manual) were taken at selected terminal gates. These counts identified 9,463 weekday truck moves to/from Port of Baltimore terminals. Assuming that the counts captured approximately 75% of Port of Baltimore trips, total weekday truck moves would be around 12,500 per day. Trucks associated with Seagirt, Dundalk, and the Seagirt ICTF tend to operate primarily between 7AM and 5PM, with inbound volumes peaking between 9 and 10 AM and outbound volumes peaking between 2 and 3 PM. Truck activity for other terminals tends to be more evenly distributed throughout these hours. Overall, this means that there are less Port of Baltimore trucks traveling in the commuter peak hours (when highways are most congested) than in the midday hours (when highways are less congested).

To develop additional information on where these trips are coming from and going to, a program of one-day weekday trucker surveys was conducted at five major Port of Baltimore terminals (Seagirt, Dundalk, North Locust Point, Rukert Terminals, and C. Steinweg) with high trip generation characteristics. At each location, written surveys were distributed to inbound truckers at the terminal entrance gates, and completed surveys were collected at the exit gates. The results indicated that for the sampled terminals, nearly 80% of all trips were to and from destinations in the Baltimore region. The results also indicated that for out-of-region travel, I-83 and I-70 and I-95 were extremely important corridors, and that nearly all out-of-region truckers used I-95 and I-695 to get to and from these corridors.

Port of Baltimore activities appear to represent a relatively high share of total truck activity in the Seagirt/Dundalk, Canton, Locust Point, and Sparrows Point areas. They appear to represent a moderate share of total truck activity in the Curtis Bay, Hawkins Point, and Fairfield areas, and a lower share of total trucks in the Highlandtown area. Port of Baltimore activities do not, however, appear to account for a significant share of truck activity on the region's interstate highways, with the exception of the Fort McHenry Tunnel.

During this study, shippers and terminal operators were contacted regarding their use of rail. The interviews confirmed that weight and distance are the primary factors governing landside modal use decisions. Rail is most efficient for heavy bulk commodities, such as coal, rock, and agricultural bulk shipments, or for non-bulk shipments (such as containers) moving long distances. For non-bulk goods moving shorter distances, truck is generally preferred because of lower transfer costs and greater service flexibility. Because the Port of Baltimore is primarily a local and regional distribution Port, serving a "freightshed" consisting mostly of customers within 500 miles, and because it handles a diverse mix of cargo types, most of its cargo prefers truck over rail.

Near-Term Needs

Several intersections in the Port area will benefit from planned improvements, leaving only one intersection -- Quarantine Road at Hawkins Point Road – as a potential concern in the near-term. Portions of the regional highway network with current congestion issues will also benefit from planned improvements, and we would not identify any near-term unmet needs from a capacity standpoint.

Building on the capacity analyses, the consultant team conducted a series of field observations of local access roads, and identified opportunities for potential improvements to roadway conditions, operations, and connections that should be further evaluated by responsible agencies.

In 2001, the Baltimore Metropolitan Council led an interagency freight workshop to identify National Highway System connector issues and needs and develop recommendations. These needs reflected a combination of infrastructure, operations, and land use issues, and were not limited to Port of Baltimore (or necessarily generated by) Port of Baltimore activities. Some of these are similar to observations made by the Consultant team, and some are already being addressed by ongoing or planned improvements; others remain issues for further investigation.

Shippers and terminals that currently utilize rail report a good level of service and access, with some room for improvement. Interviewees that do not currently use rail for landside distribution say that rail does not provide competitive service to their customers. One of the principal reasons for the lack of rail competitiveness is the regional nature of the Port of Baltimore "freightshed." Most shippers and terminal operators said they will continue to use the same modal split in the future, unless the cost of rail decreases or new business opportunities present themselves that require increased utilization of rail freight. Near-term rail needs are identified in the proposed Mid-Atlantic Rail Operations Study (MAROps) improvements program, and may be modified by further studies of Baltimore rail corridor alternatives.

Long Range Needs

At forecasted growth levels, Port of Baltimore truck trip generation is expected to roughly double by the year 2025. To test the effect of this growth, each of the local access routes previously analyzed for current performance was re-analyzed for future performance. One additional intersection – Boston Street at Ponca Street – emerged as a potential concern from a capacity standpoint.

Even with substantial growth, Port of Baltimore trucks represent only a limited share of regional truck traffic. The BRTB's regional travel demand model forecasts over 485,000 daily heavy truck trips from all sources in year 2025, and the 24,000 daily truck trips forecast for the Port of Baltimore would comprise an estimated 5% of all regional truck trips. What happens to the other 95% of trucks, and what happens to background auto traffic (which significantly outnumbers truck traffic), will be far more critical determinants of future conditions on the regional access system than growth at the Port of Baltimore.

The BRTB's Constrained Long-Range Plan (CLRP) contains a set of proposed transportation infrastructure improvements that member jurisdictions have committed to fund over a 20-30 year timeframe. According to their forecasts, by the year 2030, the region's interstate system will carry more than half of all daily travel (measured by vehicle miles traveled, or VMT). Roughly one-half of morning peak VMT on the interstates will occur in conditions of congestion, and roughly one-quarter or all VMT on the interstates will occur in conditions of congestion. Peak hours will tend to "smear" out throughout the day, making it increasingly difficult for trucks to avoid congestion.

The BRTB's Preferred Scenario reflects additional improvements compared to the CLRP, and provides for better year 2030 system performance across a variety of important measures. However, the overall findings regarding highway system congestion are fairly similar to the CLRP scenario – much of the region's system will experience unacceptable levels of service for one hour or more per day. In order of magnitude terms, average trip times will increase by 25%, and the amount of VMT during congested periods will more than double.

Addressing regional highway congestion is, in our view, the most significant long-range truck access challenge facing the Port of Baltimore. However, it must be noted that the Port of Baltimore is not alone in facing this problem. Other mid-Atlantic ports – New York/New Jersey, Philadelphia, Wilmington, Norfolk, etc. – will be contending with comparable (if not worse) levels of regional congestion. To the extent that the Baltimore region's issues can be addressed faster and more effectively than in other port regions, it would offer a significant competitive advantage for Maryland's Port of Baltimore.

With respect to rail, the most critical long-range challenge is to address capacity and clearance constraints associated with Baltimore's antiquated rail tunnels. This is being addressed through the MAROps study, and through parallel investigations of various Baltimore rail corridor alternatives.

Opportunities

The Regional Landside Access Study for Maryland's Port of Baltimore is a planning study. It was not intended to substitute for capital plans prepared by various responsible agencies, nor was it intended to dictate responsibility for particular improvements or actions or expenditures. It was intended to suggest a set of cross-modal and cross-jurisdictional issues and opportunities, so that responsible agencies can work

cooperatively from a common road map of potential actions. This could be accomplished within existing organizational relationships, or by creating new kinds of cross-modal and cross-jurisdictional relationships focused on critical freight access issues.

One of the important and positive findings of this study is that many of the projects currently planned/programmed by MDOT, BRTB, and/or the City of Baltimore will support and enhance truck access to the Port of Baltimore. Another important finding is that there are a number of additional opportunities that appear worthy of further consideration, to ensure that the access needs of Maryland's Port of Baltimore are met well into the future. These include: expedited delivery of planned improvements; possible additional improvements; and possible policy initiatives. Table ES-1 below summarizes the opportunities identified in the *Regional Landside Access Study for Maryland's Port of Baltimore*, along with an indication of which study goals are met by each.

The City of Baltimore, adjoining municipalities, regional governments, and the State all share in interest in supporting the Port of Baltimore by continuing to provide investments that maintain and enhance the Port's clear and substantial economic return. At the same time, multiple demands and limited budgets impose the necessity of giving priority to those planned or potential transportation investments that benefit the Port of Baltimore most cost-effectively. Those that accord with the City's, Counties' and State's broader objectives, be they related to economic development, safety, neighborhood revitalization or congestion mitigation are especially worthwhile. Further planning will be needed to determine the specific effect and benefit of these recommendations, individually and in combination. In the meantime, the key stakeholders with an interest in landside access for Maryland's Port of Baltimore should continue to work together to study, prioritize and implement needed improvements within the context of Maryland's overall transportation system needs.

Table ES-1. Summary of Opportunities

Recommendations	Study Goals				
	System Preservation	Connectors and Corridors	Customer Choice	System Performance	Good Neighbor Practices
Selected Highway Projects from Existing Plans and Programs					
Regional Interstate System – I-695, I-95, I-83 projects		X	X	X	
Rehabilitate Newkirk Street	X				
Rehabilitate Haven Street	X				
Keith Avenue Extension	X	X		X	
Replace Hawkins Point Road Bridge over CSX tracks	X	X			
Reconstruct Chesapeake Ave.	X				
New Key Hwy E/Hull Street Connector Loop Road		X		X	

Table ES-1. Summary of Opportunities (continued)

Recommendations	Study Goals				
	System Preservation	Connectors and Corridors	Customer Choice	System Performance	Good Neighbor Practices
Additional Highway Project Recommendations for Further Study					
Boston Street Projects	X	X		X	X
Boston/Ponca Improvements		X		X	
Clinton/Keith Truck Corridor		X			
Keith/Broening Intersection		X		X	
I-895 Interchanges		X	X	X	
I-95/Keith Interchange		X		X	
Holabird/Haven Connector		X	X		X
Quarantine Rd/Hawkins Point Intersection		X		X	
I-895/Shell Road Connector		X	X	X	X
Shell Road Extension(s)		X	X	X	X
I-70 Improvements		X	X	X	
I-83 Improvements		X	X	X	
Pavement evaluations (Broening, Newgate, Vera, Chesapeake, Shell, Patapsco, Fairfield, Quarantine)	X				
Signal evaluations (Keith, Broening, Pennington)				X	
Highway Policy Recommendations for Further Study					
Value Pricing			X	X	
Toll Policy			X	X	
Managed Lanes		X	X	X	
Intermodal Partnership			X	X	X
Short Sea Shipping			X	X	X
Multi-State Assessment		X		X	
Recommendations for Private Sector Rail Improvements					
Rail service improvements		X	X	X	
Recommendations for Public Sector Rail Improvements					
MAROps Program/Baltimore Corridor Alternatives	X	X	X	X	X
Rail preservation funding	X		X	X	
Coordination of freight and passenger planning, improvements, operations		X	X	X	X

1.0 About this Report

1.1 Overview

The Maryland Department of Transportation (MDOT) Office of Planning and Capital Programming, in consultation with a team led by Cambridge Systematics Inc. (CS) has prepared the *Regional Landside Access Study for Maryland's Port of Baltimore*. The study was guided by a Management Team of public agencies and an Advisory Committee of public and private stakeholders.

The purpose of the study was to document current and future transportation conditions over a 20-year timeframe and identify strategies to benefit access and mobility for Maryland's Port of Baltimore and related industries. This includes both public and private marine terminals in the Port of Baltimore. The study focused on landside access issues, and did not address marine terminal operations or "inside the gate" port activities.

Many different public agencies and private stakeholders are responsible for developing and maintaining infrastructure and providing transportation services to support Maryland's Port of Baltimore. Each of these entities has its own capital planning and business planning process. This study did not provide a set of capital recommendations to be superimposed on the various processes of responsible agencies and entities; rather, it did develop information and recommendations that may assist these agencies in developing coordinated, beneficial strategies as part of their planning for near-term and long-range improvements.

1.2 Task Areas

The main task areas included:

- Further define the focus of the study effort in collaboration with the Project Management Team and the Advisory Team.
- Compile available data on highway and rail system conditions and volumes, collect new volume and origin-destination data for Port of Baltimore truck traffic, identify near-term critical needs, and project future (2010 and 2025) highway and rail needs.
- Develop summary recommendations and project deliverables.

1.3 Organization of this Report

The Report is organized as follows:

- Section 1: About this Report
- Section 2: Study Vision and Goals
- Section 3: Maryland's Port of Baltimore
- Section 4: Growth and Land Use Plans Affecting the Port of Baltimore
- Section 5: Transportation Investments Benefiting the Port of Baltimore
- Section 6: Current System Performance
- Section 7: Near-Term Needs
- Section 8: Long-Range Needs
- Section 9: Opportunities

The Report is followed by a set of nine Appendices which provide additional detail.

2.0 Study Vision and Goals

The study was guided by a Project Management Team (comprised of public agencies) and an Advisory Team (comprised of public and private sector stakeholders). These two groups guided the formation of the following vision and goals for the study.

2.1 Study Vision

The following vision statement was formulated:

Seaports, highways, railroads, airports, and transit systems are vital in transporting raw materials, finished goods, and people to, from and within the State of Maryland. This multi-modal transportation network establishes Maryland's Port of Baltimore as one of the nation's leading seaports. Maryland's Port of Baltimore, in turn, supports Maryland's economy and role as an international gateway. Preserving and enhancing the landside transportation system that provides Maryland's Port of Baltimore with highway and rail connections to its customers and markets is essential, not only for the efficient operation and future growth of the Port, but also for the businesses and employees that depend on the Port.

2.2 Study Goals

Subordinate to this vision, the following goals were formulated:

- *System Preservation. Promote system preservation and good stewardship of transportation assets.*
- *Connectors and Corridors. Identify, preserve, and implement critical freight access connectors and corridors at the local, regional, State, and multi-state levels.*
- *Customer Choice. Promote efficient, cost-effective transportation options for freight shippers and receivers.*
- *System Performance. Preserve and enhance transportation service speed, safety, reliability, and security for freight movement.*
- *Good Neighbor Practices. Help freight be a "good neighbor" to adjacent land uses and reduce conflicts between freight and others.*

3.0 Maryland's Port of Baltimore

3.1 Economic Significance

In 2003, more than 40 million tons of cargo – representing almost $26 billion in value – passed through the Port of Baltimore. The Port ranked eighth in the United States and fourth on the Atlantic coast in terms of value. For overall tonnage, the Port of Baltimore ranked third among Atlantic Coast ports.[1]

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The Port has natural advantages that have contributed to its historic importance. Due to its inland location, the Port of Baltimore is closer to the population and manufacturing centers of the mid-west than any other Atlantic port. Thirty-five percent of the United States' manufacturing base and 32% of its population can be reached overnight by truck from the Port of Baltimore.[3]

The Port of Baltimore includes both public (Maryland Port Administration) and private terminals. General cargo (which includes all non-bulk cargo) is handled primarily by the Maryland Port Administration's public terminals, and includes containerized commodities, automobiles and other roll-on/roll-off (RoRo) cargo, and forest products. Bulk cargo (petroleum, coal, salt, etc.) is handled primarily by private terminals, and accounts for 80% of the Port's total tonnage. During 2003 and 2004, the Port of Baltimore ranked second in tonnage among all United States ports for importing and exporting automobiles and first for RoRo cargo.[1]

For detailed year 2003 performance statistics, readers are referred to Appendix A.

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[1] U.S. Army Corps of Engineers data.

[2] Martin Associates, "The Economic Impacts of the Port of Baltimore", 2003.

[3] Maryland Port Administration website accessed 1/12/05. http://www.mpa.state.md.us/location/index.htm

3.2 Terminals and Operations

Port of Baltimore terminals handle a variety of commodities. While the general operation of moving cargo from vessels to trucks or rail cars and vice-versa is similar for each terminal, the commodity types, volumes, and access conditions vary from terminal to terminal within the Port. Throughout this report, we distinguish between privately-owned terminals and publicly-owned terminals.

The Port of Baltimore's forty-nine public and private terminals and facilities are situated around the headwaters of the Patapsco River. Forty-three are located entirely within Baltimore City, four are within Baltimore County (Sparrows Point area), one straddles Baltimore City and Baltimore County (Dundalk Marine Terminal) and one is within Anne Arundel County (U.S. Coast Guard Yard). Figure 1 on the following page shows the location of each of the terminals within the Port of Baltimore.

Available information regarding major terminal attributes – commodities handled, storage capacity, and relative need for/utilization of truck and rail access – was obtained initially from published documents and websites. Additional information was collected through telephone surveys of terminal.[4] For major terminals, full operating day traffic counts were taken (right outside the gate, where possible) by the consultant team to determine the number of trucks moving into and out of the facility, as discussed later in this report. Terminal information is summarized in Appendix B.

[4] Note: Phone interviews were attempted with 45 terminal operators resulting in 29 successful interviews (or 64 percent). The remaining terminal operators either declined to be interviewed or were unavailable after repeated attempts to contact them.

Figure 1. Terminal Locations

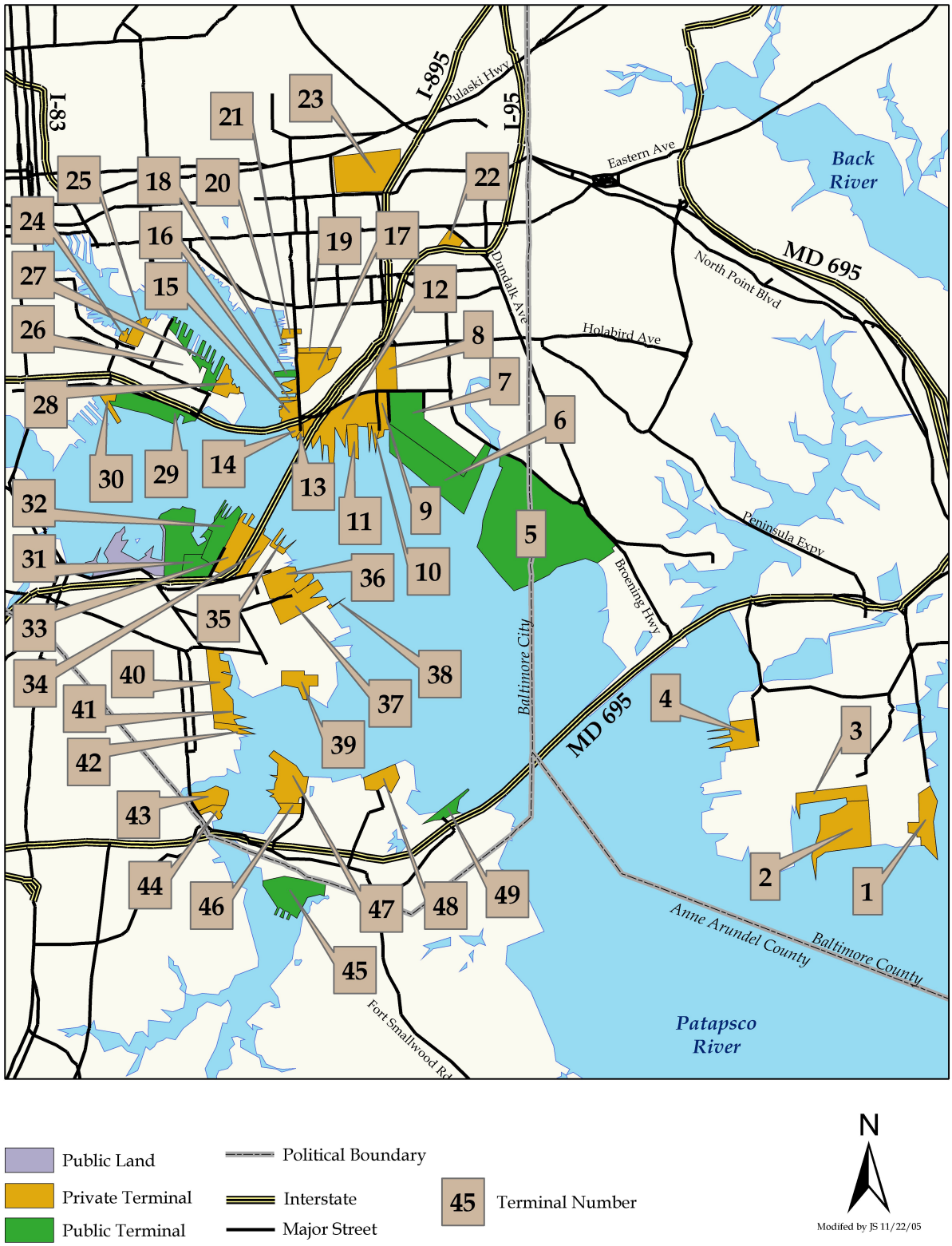


Figure 1 (continued).

Location	Type	Terminal	Location	Type	Terminal
1	Private	Pennwood Wharf (Mittal)	26	Private	Locust Point Grain Elevator (demolished)
2	Private	Mittal Steel Ore Pier	**27**	**Public**	**North Locust Point Marine Terminal**
3	Private	Chesapeake Bulk Stevedores	28	Private	Baltimore Metals and Commodities Terminal
4	Private	Baltimore Marine Industries	**29**	**Public**	**South Locust Point Marine Terminal**
5	**Public**	**Dundalk Marine Terminal**	30	Private	Tyco Submarine Systems
6	**Public**	**Seagirt Marine Terminal**	**31**	**Public**	**Masonville Marine Terminal**
7	**Public**	**Seagirt Intermodal ICTF**	**32**	**Public**	**Fairfield Auto Terminal**
8	Private	Canton Railroad	33	Private	Atlantic Terminals
9	Private	National Gypsum	34	Private	ST Services
10	Private	Canton Marine Terminal Pier 13	35	Private	Port Liberty
11	Private	Canton Pier 10/11 (Vane Bros)	36	Private	Chesapeake Terminals
12	Private	CNX	37	Private	Baltimore Asphalt Refinery Dock
13	Private	Rukert Terminals	38	Private	Condea Vista Company
14	Private	Rukert Terminals; Lazaretto	39	Private	Citgo / Tosco
15	Private	Lehigh Portland Cement	40	Private	CSXT Chesapeake Bay Ore Pier
16	Private	Rukert Terminals	41	Private	CSXT Chesapeake Bay Coal Pier
17	Private	Rukert Terminals; Clinton Street	42	Private	CSXT Chesapeake Bay Shiploader Pier
18	**Public**	**Clinton Street Marine Terminal**	43	Private	Amerada Hess Dock
19	Private	Rukert Terminals	44	Private	Amoco Oil Company
20	Private	Highland Terminal	**45**	**Public**	**U.S. Coast Guard Yard**
21	Private	Petroleum Fuel and Terminal Co.	46	Private	Blue Circle Cement (Lafarge)
22	Private	Belt's Business Center	47	Private	W.R. Grace & Company
23	Private	Norfolk Southern (Bayview)	48	Private	U.S. Gypsum Dock
24	Private	General Ship Repair	**49**	**Public**	**Hawkins Point Marine Terminal**
25	Private	Domino Sugar			

3.3 Truck Access

Generally, Port of Baltimore terminals can be grouped according to the following geographic clusters:

- Dundalk and Seagirt
- Canton
- Locust Point
- Fairfield
- Curtis Bay/Hawkins Point
- Sparrows Point
- Highlandtown

Figures 2 on the following page depicts the primary truck access routes to these terminal clusters. Appendix C provides additional detail on local access to each terminal cluster.

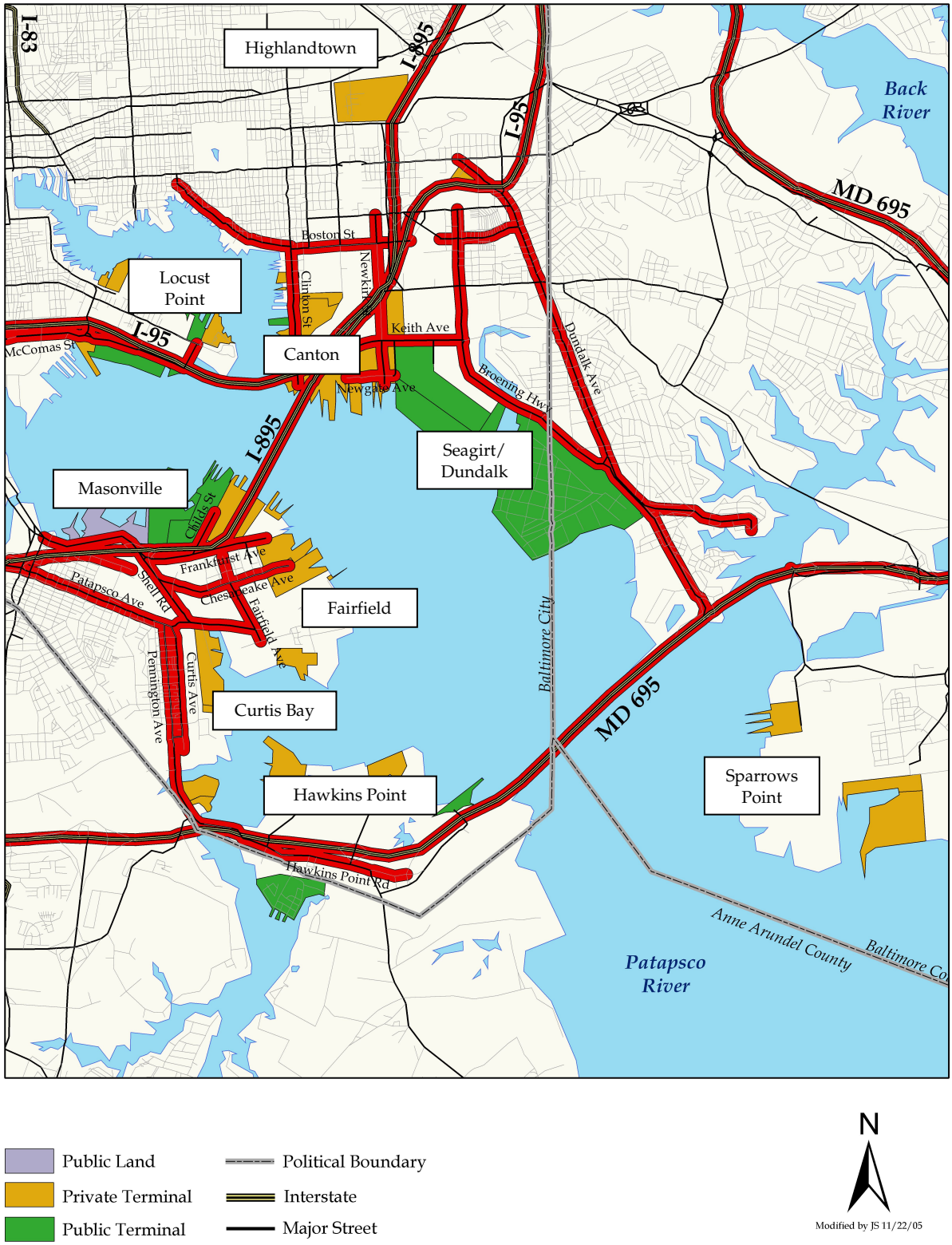
3.3.1 Interstate System

- **Interstate 95** is the primary north-south freeway to urban centers on the eastern seaboard. I-95 connects directly to I-895 and I-695 just outside the study area. I-95 serves a mix of local commuter and through interstate trips in the peak hours.

- **Interstate 695 / Maryland 695** is Baltimore's Beltway, and provides access to the Curtis Bay terminals, Dundalk, Seagirt and Sparrows Point. I-695/MD 695 also serves local commuter and through interstate trips.

- **Interstate 895**, the Baltimore Harbor Tunnel Thruway, provides the third North-South fully access-controlled freeway crossing of the Patapsco River and provides access to terminals on Baltimore's eastern edge. It enters the immediate port area near the Masonville, Fairfield, and Atlantic auto terminals, the ST Services and Chesapeake Terminals, the Condea Vista facility and the Baltimore Asphalt Refinery Dock. North of the tunnel, access is provided to all of the terminals in the Canton and Dundalk areas, including the Seagirt and Dundalk Marine Terminals, the GM plant site, the Holabird Industrial Park and National Gypsum. Local commuter and through interstate trips comprise the bulk of the peak period traffic stream. Oversized loads and vehicles carrying hazardous materials are not allowed through the tunnel.

Figure 2. Major Truck Access to Port of Baltimore Terminals



3.3.2 Surface Arterial System

- **Broening Highway** is a principal arterial roadway linking both the Seagirt and Dundalk Marine Terminals to the regional highway network. The traffic stream is predominantly local, and includes a large component of heavy vehicles. Several large industrial uses abut Broening Highway, including the Holabird Industrial Park.

- **Keith Avenue** connects Clinton Street on the west with Broening Highway on the east. It serves as the primary connector between I-95 and nearly all of the terminals on the east side of the Patapsco River, including the Seagirt and Dundalk Marine Terminals on Broening Highway, as well as Canton terminals including the Rukert and Lehigh terminals on Clinton Street. The predominant land uses along Keith Avenue are industrial. Most traffic is locally generated, with a large contingent of trucks.

- **Dundalk Avenue** begins at Eastern Avenue (MD 150) roughly midway between I-95 and I-895 in Baltimore City, and extends in a south-southeasterly direction to Bear Creek north of the Patapsco River. The predominant traffic is local, and includes a large composition of heavy vehicles. The section of Dundalk Avenue that is within Baltimore City restricts truck traffic in the overnight hours between 6 PM and 6 AM.

- **Boston Street** is one of two main east-west streets (the other is Keith Avenue) through the Canton area, north of the Patapsco River. The traffic stream is predominantly local, and includes a large composition of heavy vehicles.

- **Clinton Street** is the primary north-south roadway in the Canton area and provides access to many terminals, including Rukert, Lehigh Portland Cement, and the MPA Clinton Street Marine Terminal. Most uses are residential north of Boston Street. A section of Clinton Street just south of Holabird Avenue has been closed since 2003 due to a bulkhead failure.[5] Predominant traffic is local, and includes a large composition of heavy vehicles.

- **Frankfurst Avenue** is an east-west four-lane divided road situated south of the Patapsco River tunnels, providing access to Masonville and Fairfield terminals. The predominant traffic is local, and includes a large composition of heavy vehicles

- **Childs Street** is a short northeast-southwest street in the Fairfield area that functions as an access road for Masonville and Fairfield terminals.

- **Shell Road** connects Frankfurst Avenue on the north with Patapsco Avenue on the south. Shell Road is four lanes wide throughout its length.

- **Chesapeake Avenue** begins at Shell Road to the west and ends at the Patapsco River to the east.

[5] Repairs to Clinton Street at the location of the bulkhead failure are underway and scheduled to be completed by December, 2006.

- **Fairfield Avenue** is a two-lane north-south street connecting Chesapeake Avenue in the north to Northbridge Avenue towards the south.

- **McComas Street** is an east-west road connecting Hanover Street (MD 2), Key Highway, and Interstate 95 with the North Locust Point and South Locust Point Marine Terminals.

- **Patapsco Avenue** enters the Port area at the intersection with MD 2 and travels east to the intersection with Fairfield Avenue in the East Brooklyn area. Predominant traffic is local, and includes a large composition of heavy vehicles.

- **Hawkins Point Road** is a four-lane undivided street that begins at a three-way intersection with Pennington Avenue and Ordnance Road on the west side of Curtis Bay, and provides access to the Hawkins Point terminals.

- **Newgate Avenue** is a short local street connecting with Newkirk and New Vail Streets on the east in Canton.

- **Pennington Avenue** is a north-south street connecting Patapsco Avenue on the north to Ordnance Road and Hawkins Point Road on the south in Curtis Bay. Traffic is predominantly local, and includes a large composition of heavy vehicles

- **Curtis Avenue** is a two-lane, one way road connecting Benhill Avenue to the south with Patapsco Avenue to the north in Curtis Bay. Predominant traffic is local, and includes a large composition of heavy vehicles.

- **Newkirk Street** is a north-south road in Canton that connects Newgate Avenue to the south with O'Donnell Avenue to the north.

3.4 Rail Access

The Port of Baltimore is served by two Class I[6] carriers, CSX (comprising CSX Transportation and CSX Intermodal) and Norfolk Southern Railway (NS). The Port is also served by the Canton Railroad, a Class III railroad and the Patapsco & Back Rivers Railroad, a switching railroad principally serving the Sparrows Point complex. Within the Port, CSX and NS provide on-dock rail service to all the State-owned terminals and most private terminals, directly or through haulage agreements with the Canton Railroad.

[6] Freight Railroads are classified by the Surface Transportation Board (STB) by annual revenue. Class I railroads have revenues exceeding $277 million; Class II between $20 and $277 million; and Class III up to $20 million. Class I railroads are major interstate carriers. Class II's are usually regional railroads and Class III's are usually considered short lines.

Figure 3 below illustrates the regional rail network that feeds the Port of Baltimore. CSX serves the Port with routes from the Midwest, Northeast, and Southeast states. NS provides a similar level of service to the Port through trackage rights that allow its trains to run over CSX and Amtrak's Northeast Corridor. MARC commuter trains pay for use of Amtrak and CSX tracks in this area.

Figure 3. Regional Rail System Serving Port of Baltimore

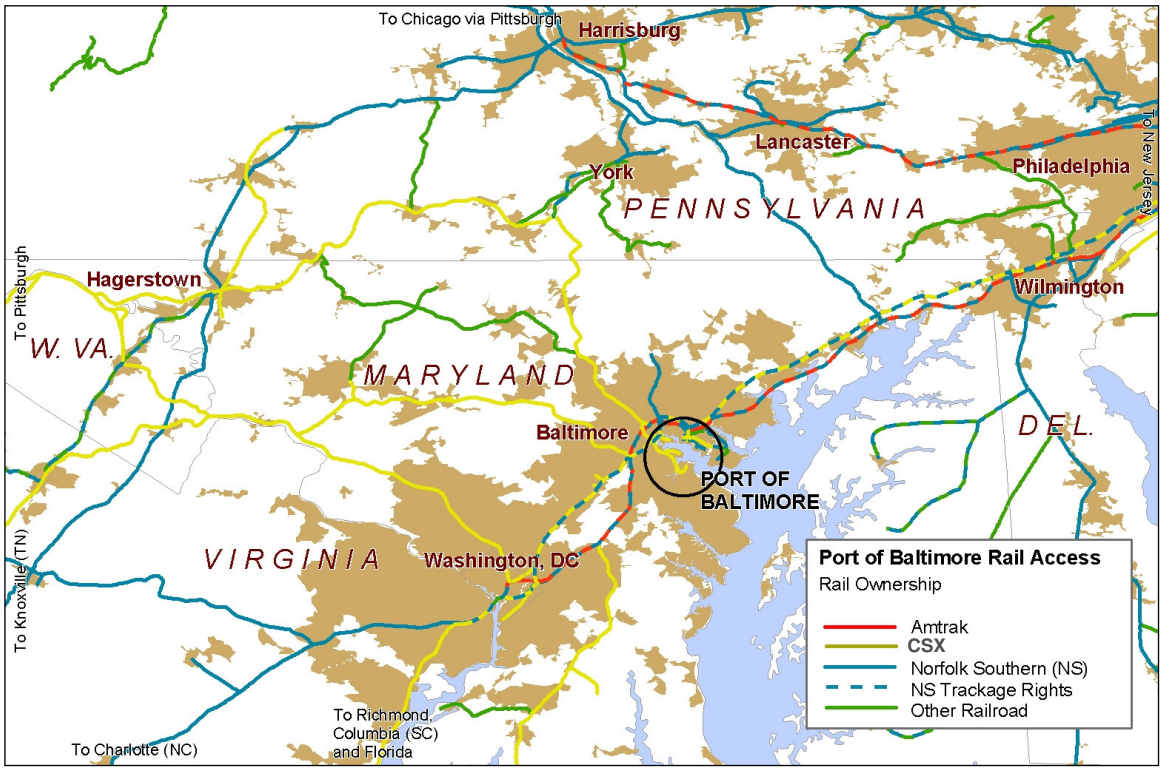


Table 1 on the following page summarizes rail access to the marine terminals of the Port of Baltimore. The table indicates which railroads provide service to each terminal and describes the primary cargo types at each terminal.

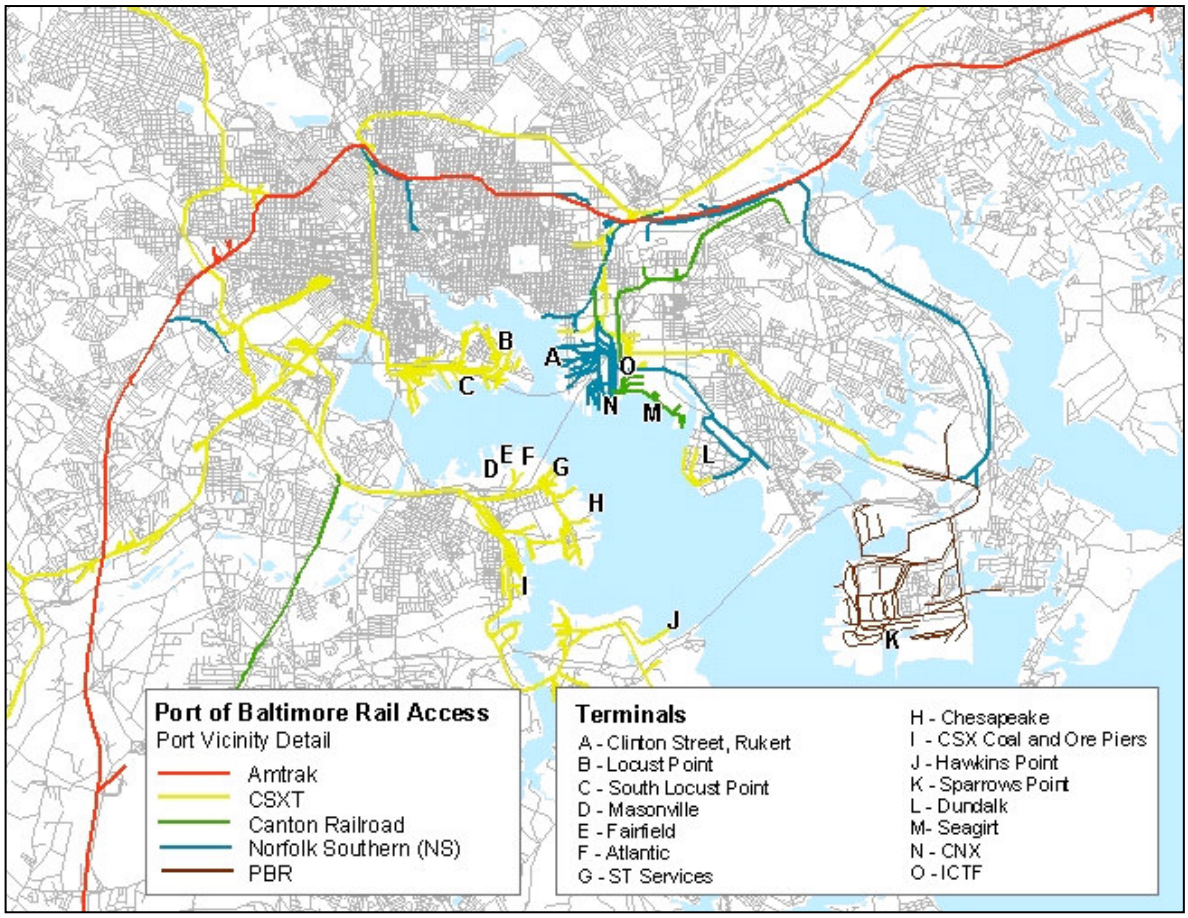
Figure 4 following provides a more detailed graphical view of which railroads serve which terminals. Appendix D provides additional information on the railroads serving the Port of Baltimore.

Table 1. Port of Baltimore Rail Terminal Access

			Cargo Type			
ID	**Marine Terminal**	**Railroads**	**Auto / RoRo**	**Intermodal**	**Bulk**	**Breakbulk**
33	Atlantic	CSX	●			
40, 41	CSXT Chesapeake Coal and Ore Piers	CSX			●	●
36	Chesapeake	CSX	●			
5	Dundalk Marine	NS	●	●		●
13, 14, 16, 17, 19	Rukert Terminals	NS			●	●
49	Hawkins Point	CSX			●	
7	Seagirt ICTF	CSX		●		
31	Masonville	CSX	●			
27	North Locust Point	CSX			●	●
29	South Locust Point	CSX	●			●
1 - 4	Sparrows Point	CSX, NS, PBR			●	●
34	ST Services	CSX			●	

Source: MPA

Figure 4. Railroads Serving Port of Baltimore Terminals



3.5 Proximity to Inland Markets

The Port of Baltimore's physical location places it closer to many major centers of production and consumption in the mid-Atlantic and Midwest than competing ports. An estimated 32% of the nation's population is within an overnight drive from the Port.

Table 2. Highway Mileage to Selected Major Inland Markets

	Port of Baltimore	Virginia Port Authority	Port of Philadelphia	Port of New York and New Jersey
Baltimore MD	**0**	231	99	180
Washington DC	**45**	193	135	216
Harrisburg PA	**86**	313	112	162
Pittsburgh PA	**256**	430	311	363
Charleston WV	**373**	408	461	523
Columbus OH	**420**	594	474	527
Toronto ON	**472**	667	503	486
Detroit MI	**535**	709	590	611
Frankfort KY	**546**	581	634	719
Indianapolis IN	**595**	719	649	701
Nashville TN	709	**705**	799	277
Chicago IL	**709**	883	764	785
St. Louis MO	**837**	912	891	944

Source: StreetAtlas USA 2006 Routing Software

Cargo is routed through different US ports for different reasons – including location with respect to maritime trade lanes, performance and cost of terminal facilities, and landside distance and accessibility to US shippers and receivers. Providing superior landside access offers an important competitive advantage for serving current local markets – particularly Baltimore, Washington, and the rapidly-growing southeastern PA warehouse/distribution cluster – as well as supporting growth in more distant markets. This advantage could be enhanced and multiplied with rail improvements targeted specifically at longer-distance moves, where rail is often more attractive than truck.

As landside access pressures continue to mount at competing ports and throughout the nation's landside transportation network, the Port of Baltimore's highway proximity advantage is likely to become even more significant – provided that the region's transportation infrastructure keeps pace with demand. To this end, a series of transportation investments are planned for the Baltimore region; these investments are targeted at local and regional congestion, in both the near and long term, and should substantially benefit the Port of Baltimore. These investments are described in Section 4 of this report.

4.0 Transportation Investments Benefiting the Port of Baltimore

4.1 Highway Improvements

Local and regional highway improvements that will improve access to Maryland's Port of Baltimore have been programmed by a variety of agencies, including the City of Baltimore, the Baltimore Regional Transportation Board, and the Maryland Department of Transportation. Funding is being provided from local, regional, state, and federal sources. Collectively these projects represent an investment of more than $25 billion dollars over the next 25 years to improve the region's critical highway infrastructure.

4.1.1 Local Highway Improvements

Local transportation improvements are identified in Baltimore City's Capital Improvement Program (CIP) and the Baltimore Regional Transportation Board's (BRTB) transportation improvement program (TIP); many (not all) are included in both programs.

Key projects are mapped on Figure 5 on the following page. Several projects are currently under construction, including reconstruction of the Clinton Street bulkhead and construction of a new Loop Road serving Locust Point. Other planned projects significant to the Port area consist primarily of capacity enhancement, bridge repairs, and pavement rehabilitation.

Figure 5. Selected Local Highway Improvements Benefiting the Port of Baltimore

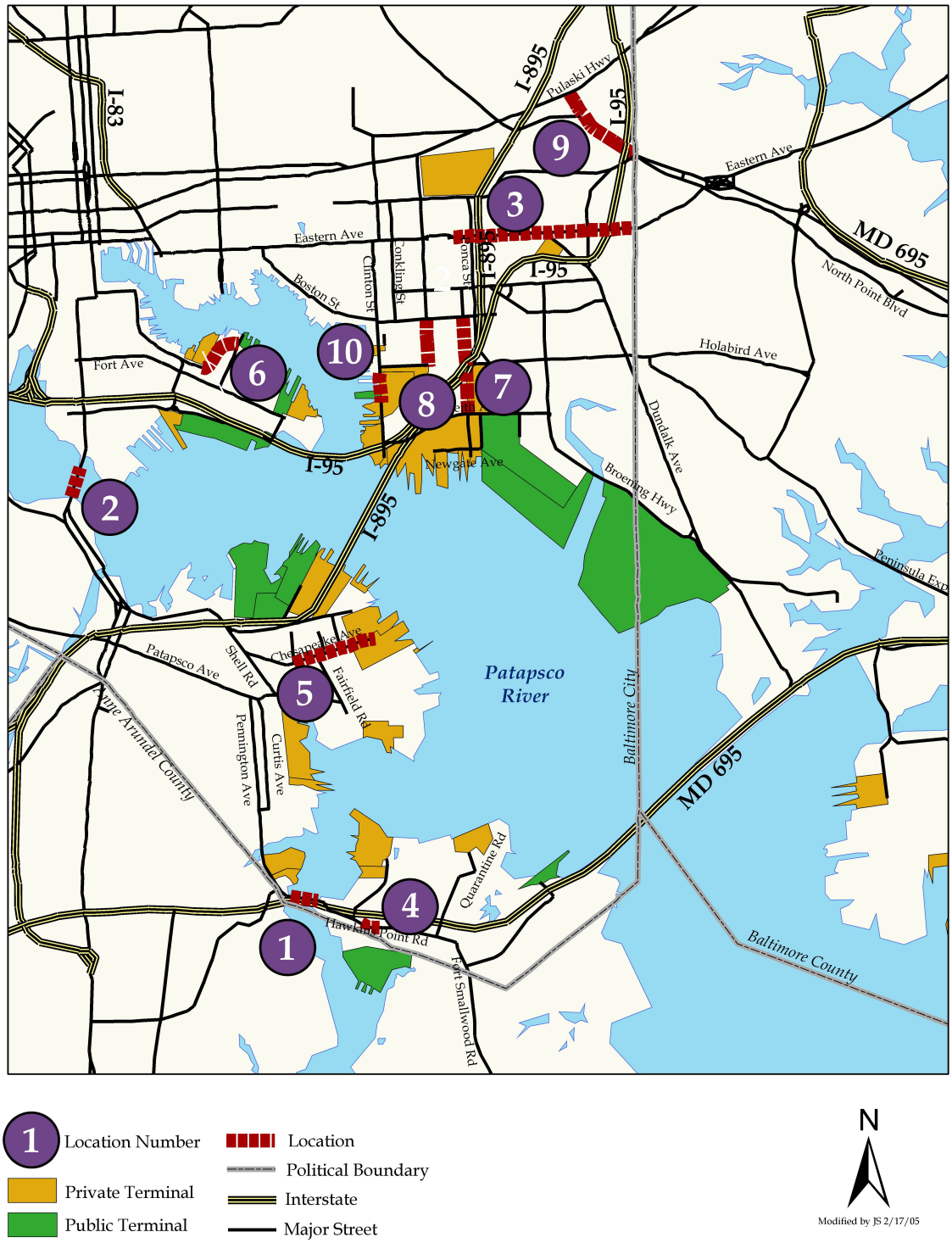


Figure 5 (continued).

Location Number	Baltimore City CIP #	BRTB TIP Number	Description	Planned Construction	Lead Agency
1	508-332	12-0403-19	Replace control units on Pennington Avenue Bridge over Curtis Creek.	2007	Baltimore
2	509-299	12-0406-19	Replace control panel and drive motor of the Hanover Street drawbridge.	2007	Baltimore
3	514-596	12-0427-11	Resurface Eastern Avenue from Lehigh Street east to City line.	2006	Baltimore
4	507-416	12-9903-13	Replace Hawkins Point Road bridge over CSX tracks.	2007	Baltimore
5	509-674	12-0422-12	Reconstruct Chesapeake Avenue from Sun Street east to terminus.	2006	Baltimore
6	507-436		New connection between Key Highway East and Hull Street using existing rail right-of-way (Loop Road).	Underway	Baltimore
7	527-106		Rehabilitate Newkirk Street from Keith Avenue to Boston Street.	2008	Baltimore
8	527-108		Rehabilitate Haven Street from Boston Street to its dead end.	2008	Baltimore
9	506-530		Resurface North Point Road from Pulaski Highway to City line.	2006	Baltimore
10	509-082		Clinton Street bulkhead reconstruction.	Underway	Baltimore

Sources: City of Baltimore and BRTB 2005-2009 Transportation Improvement Plan.

4.1.2 Regional Highway Improvements

The Baltimore Regional Transportation Board's (BRTB) long-range transportation plan (Transportation 2030) details the projected development of the region's transportation system over the next 25 years. The BRTB is responsible for producing and maintaining the Baltimore region's Constrained Long Range Plan (CLRP), currently known as Transportation 2030, and its Transportation Improvement Plan (TIP). Federal law requires that all projects using federal funding must be part of the CLRP and TIP.

A parallel planning process is conducted every three years by MDOT to develop the Maryland Transportation Plan which is the Department's guiding policy document. MDOT's Consolidated Transportation Program (CTP) is a transportation capital budget document that lists and describes the transportation improvement projects where State money will be spent within the next six years. The Governor, the Secretary of Transportation, and the Modal Administrators determine which projects are added to the CTP.

BRTB's Transportation 2030 and MDOT's CTP, while separate documents with separate purposes, are linked to the extent that MDOT is an active stakeholder and participant in BRTB's planning process. Figure 6 on the following page summarizes projects from both programs that will benefit the Port of Baltimore.

Figure 6. Selected Regional Highway Improvements Benefiting the Port of Baltimore

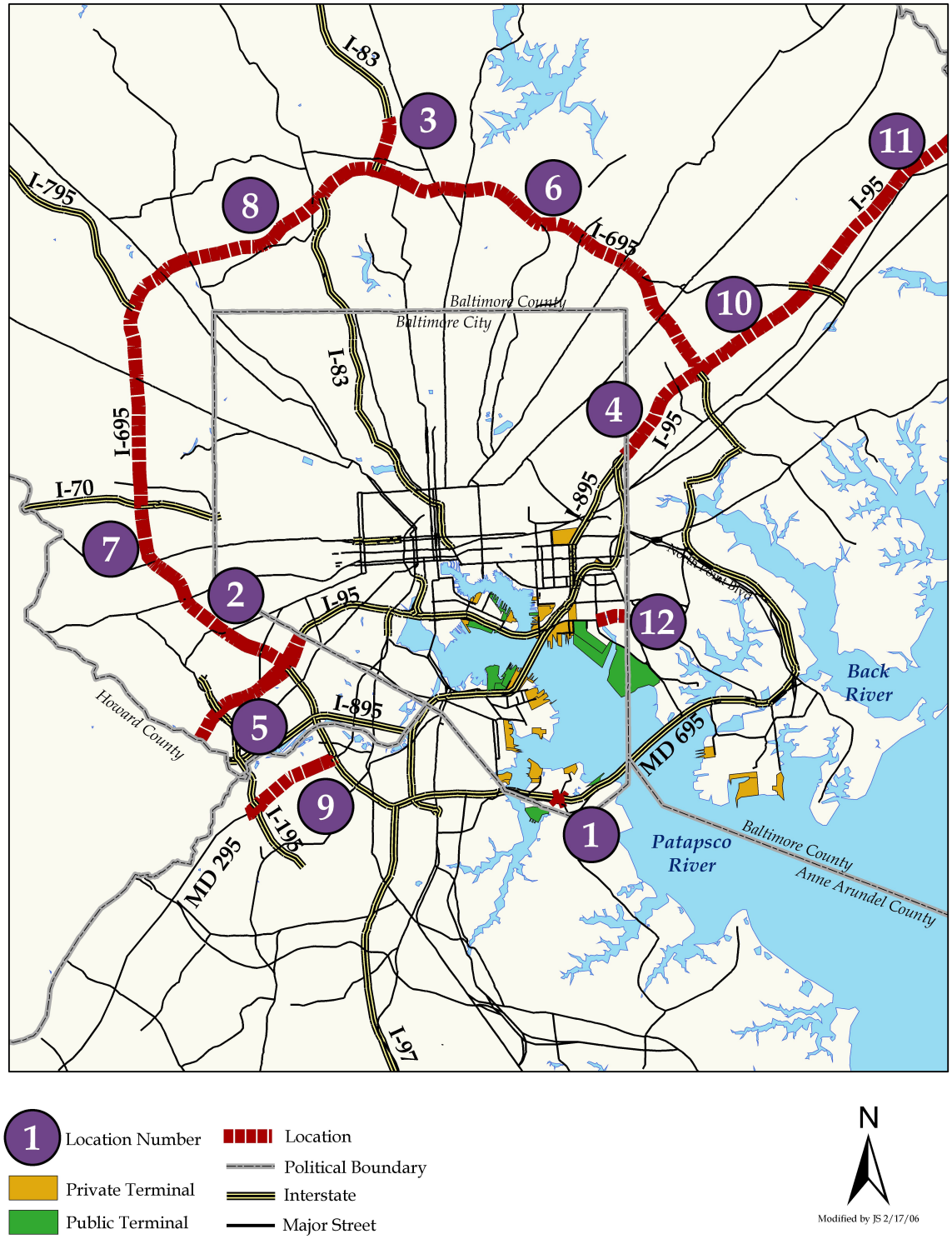


Figure 6 (continued).

Agency	Map Location	Status	Description
MdTA	1	Construction to begin by FY2007	Construct interchange improvements on MD 695 (Baltimore Beltway) at Quarantine Road.
SHA	2	Construction Underway	Construct an additional southbound lane (outer loop) on I-695 from south of MD 144 to I-95
SHA	3	Construction Underway	Widen northbound I-83 between Seminary Avenue and Timonium Road.
MdTA	4, 10	Construction to begin by FY2007	Improve I-95 interchanges with I-895, I-695 and MD 43 and construct two managed lanes in each direction from I-95 to I-895 north to north of MD 43 (9.6 miles)
BRTB	5	Transportation 2030 Plan	Widen I-95 between I-695 and the Howard / Baltimore line from 8 to 10 lanes.
SHA	6	Preliminary Planning/ Engineering	Study to upgrade existing I-695 to an 8-lane freeway from I-83 to I-95 (east) (11.38 miles)
SHA	7	Engineering / Right of Way acquisition	Upgrade existing I-695 to an 8-lane freeway from I-95 to MD 122 (5.67 miles)
BRTB	8	Transportation 2030 Plan	Widen I-695 between I-95 south and I-95 north from 6/8 to 8/10 lanes
SHA	9	Construction to begin by FY2007	Widen MD 295 from 4 to 6 lanes from I-695 to I-195
MdTA	11	Preliminary Planning	Study to investigate capacity and safety needs on I-95 from north of MD 43 to north of MD 22 (18 miles)
BRTB	12	Transportation 2030 Plan	Extend Keith Avenue from Broening Highway to Dundalk Avenue
SHA	N/A	Engineering / Right of Way acquisition	Upgrade I-70 from Mt. Phillip Road to MD 144 (near Frederick) to include widening of the 4-lane section and reconstruction of the interchanges
SHA	N/A	Preliminary Planning	Study to widen I-495 and determine feasibility of managed lanes from the American Legion Bridge to the Woodrow Wilson Bridge (42.2 miles)
SHA/MdTA	N/A	Preliminary Planning	Intercounty Connector (ICC) – construct a new east-west multimodal highway between I-270 and I-95/US 1
SHA	N/A	Construction Underway	I-95 / I-495 – Woodrow Wilson Bridge Improvement to address congestion and operational problems
SHA	N/A	Construction Underway	Construct additional ramps at the US 50/MD 2 South interchange and provide a connection between the MD 2/MD 450 intersection and Jennifer Road.

Key projects benefiting the Port of Baltimore include the following:

- Reconstruction of the Quarantine Road interchange with MD 695 (see item #1 on Figure 6) in 2007.
- Extension of Keith Avenue from Broening Highway to Dundalk Avenue along with upgrading the partial interchange at Broening Highway and Keith Avenue to a full interchange (item #12) scheduled for the year 2020.

- Widening of northbound I-83 between Seminary Avenue and Timonium Road from 3 to 4 lanes (item #3).

- Widening of southbound I-695 between MD 144 and I-95 from 3 to 4 four lanes (item #2) in 2005; widening of much of I-695 from 6 to 8 lanes in 2015 (items #6, 7, and 8).

- Widening of the Baltimore-Washington Parkway (MD 295) from 4 to 6 lanes between I-695 and MD 100 (item #9) in 2010[7].

- Widening of I-95 southbound between I-695 and I-895 from 4 to 5 lanes (item #4); widening of I-95 from 8 to 10 lanes between the Howard/Prince Georges county line and I-695 (item #5) in the year 2020; widening of I-95 from 8 to 12 lanes between the interchange with I-895(N) and MD 22 (item #10); and widening of I-95 from 6 to 8 lanes between MD 22 and the Susquehanna River (item #11), planned to be implemented in three phases between 2009 and 2015.

4.2 Rail Improvements

4.2.1 Private Investment

Most of nation's rail infrastructure is privately owned, by for profit transportation companies. The same is true in Baltimore. These companies are responsible for developing and serving markets, and for modifying (expanding or contracting) their systems to meet business objectives, and for keeping their assets in a state of good repair. This study did not examine the capital programs of the railroads serving the Port of Baltimore, but some level of ongoing private investment can certainly be assumed.

4.2.2 Public Investment

The private sector is good at maintaining its system and making limited system improvements to serve specific customers. The private sector is not good at making big-ticket investments – repair or replacement of aging bridges and tunnels, or multi-state corridor upgrades – because these represent very large up-front capital expenses, with a very long payoff period from railroad revenues. The railroads' financial situation does not support the necessary borrowing.

[7] Item #9 is a combination of two separate but related projects. The first project, which is funded and under design, is the widening of MD 295 between I-695 and I-195 while the second is a planning study and environmental assessment of the widening of MD 295 between I-195 and MD 100 including an alternative interchange at Hanover Road. If implemented, this interchange would provide direct access to a concentration of warehousing and distribution facilities.

The public sector is increasingly looking to play an active role in facilitating major rail system improvements that meet specified public benefit objectives, such as safety, security, economic growth, and highway congestion relief. With projects like the Alameda Corridor in Los Angeles and the recent Shellpot Bridge replacement in Delaware, the public sector has provided private railroads with up-front access to construction capital, which the railroads are repaying through long-term revenue streams.

One innovative program with substantial benefit is the Mid-Atlantic Rail Operations Study, or MAROps. MAROps was developed by the State of Maryland in cooperation with four other states (New Jersey, Pennsylvania, Delaware and Virginia), three railroads (NS, CSX, and Amtrak), the I-95 Corridor Coalition, and the Federal Railroad Administration. Together, the MAROps partners identified a program for $6.2 billion in rail system improvements to be implemented over 20 years in the five-state study area. The improvements are designed to work as a coordinated program to eliminate chokepoints and improve performance.

Some of the MAROps improvements have "independent utility" and produce benefits regardless of whether other improvements are implemented; others have "program utility" and must be implemented in concert with other improvements throughout the system to produce benefits. The MAROps program is not yet funded and the relative contributions of the various public and private partners have not been determined, but work is underway (through MAROps II) to achieve this; in the meantime, some of the independent utility projects are already moving forward.

The MAROps improvements would have a profound impact on rail access to the Port of Baltimore. The MAROps program would increase the overall safety, capacity and speed of freight rail operations in the entire Mid-Atlantic region. It would directly benefit the Port of Baltimore by replacing antiquated tunnels and bridges, clearing height restrictions, increasing allowable railcar weights, upgrading control and signal systems, and adding mainline capacity that will allow the Port to better serve markets to the north, south, and west. MAROps projects benefiting the Port of Baltimore are summarized in Table 3 on the following page.

Additionally, a federally-funded study recently examined the possibility of addressing the issue of Baltimore's antiquated rail tunnels using alternative rail alignments, rather than the MAROps solution of reconstructing the tunnels in their current locations.

Table 3. MAROps Improvements Benefiting the Port of Baltimore

Improvement	Railroad	Location	Description	Benefits
Capacity	CSX	Maryland State Line to Baltimore	North Maryland 2nd Main Track Project	Relieves congestion and allows future growth with new double-track segment
Capacity	CSX	Baltimore	Howard Street Tunnel	Eliminate single, double, triple track bottlenecks and improve public safety by separating highway and rail operations; improvements to industrial and yard switching efficiency
Capacity	CSX	West Baltimore to Washington, DC	Maryland 2nd and 3rd Main Track Projects	Relieves congestion and allows future growth with new double-track segment
Capacity	Amtrak (and NS)	Gunpowder, Susquehanna, and Bush Rivers	Maryland Bridges	Enhanced I-95 corridor movement of people and goods; improved weights and clearances for freight using this segment
Capacity	Amtrak (and NS)	Perryville to Baltimore	Reconfigure existing tracks and add new track to create dedicated freight route	Provide double stack clearances and unrestricted freight service (freight movement currently limited to nighttime moves on Amtrak's NEC)
Capacity	Amtrak (and NS)	B&P Tunnel-Union Tunnel,	New tunnels with improved alignments, better clearances, separate freight tracks	Largest single chokepoint outside of NY area; NS restricted to night operation; possible port benefit
Capacity	Amtrak (and NS)	Baltimore to Landover	Add freight tracks, improve clearances and increase axle loading: reconfigure existing 4 tracks west Baltimore to Halethorpe; construct 4th track Bowie to New Carrollton	Mitigate congestion and improve clearances
Capacity	NS	Mason Dixon Line to Berryville	Second Main Track	Improve capacity
Clearance	CSX	Baltimore Area	Maryland Clearance Projects (17 total projects)	Ability to move high stack equipment over this route and not be restricted with higher equipment

Note: Because NS has trackage rights on the Amtrak Northeast Corridor, as shown in Figure 3 previously, Amtrak projects also benefit rail freight.

Source: I-95 Corridor Coalition. *Mid-Atlantic Rail Operations Study*. 2002

5.0 Growth and Land Use Plans Affecting the Port of Baltimore

5.1 Maryland Port Administration Plans and Forecasts

Emerging landside access needs for the Port of Baltimore will be determined in large part by development plans over the next 20 years. Key issues and objectives for the Port of Baltimore were defined in the Maryland Port Administration's *Strategic Plan 2002*. The overall vision was defined as follows:

> ***"To remain a major catalyst in the growth of international trade, competitive or dominant in all international cargo flows through East Coast ports, sustained by strong public and private sectors, while being good stewards of Maryland's natural environment."***

In support of this vision, the *Strategic Plan 2002* established the following goals:

- To be the largest automobile port on the U.S. East Coast
- To be the largest and predominant RoRo port on the U.S. East Coast
- To be the largest import forest products port on the U.S. East Coast
- To sustain and grow container business at an annual rate greater than 3 percent
- To pursue and grow other niche cargoes, such as steel and project cargo
- To manage the World Trade Center and other MPA properties to promote the Port of Baltimore
- To provide marine facilities, shipping channels and infrastructure which are superior to other East Coast ports
- To assure that revenues exceed operating expenses through effective cost management and revenue growth

Addressing the market potential and opportunities to relocate cruise operations off of the Dundalk marine terminal is also identified as an objective. In 2004, a site in South Locust Point was identified for this purpose.

Port of Baltimore growth will lead to intensification of existing marine terminal uses and possibly to the expansion or relocation of marine terminal uses, with correspondingly increased needs for landside access. The MPA provided a cargo forecast for use in this study (see Table 4 below). Annual growth in tonnage is projected at between 3.0% and 4.0% annually for all commodity types. For planning purposes, these rates were also applied to private terminals.

Table 4. MPA Cargo Forecast and Compound Annual Growth Rate (CAGR), 2005-2020

	Maryland Port Administration Terminals				
	Cargo Forecast 2005 - 2020				
		Tons		Change %	
		High	Low	High	Low
History	1995	6,332,113	6,332,113		
	1996	5,827,581	5,827,581	-8%	-8%
	1997	6,106,566	6,106,566	5%	5%
	1998	6,080,430	6,080,430	0%	0%
	1999	6,411,741	6,411,741	5%	5%
	2000	6,232,096	6,232,096	-3%	-3%
	2001	6,175,833	6,175,833	-1%	-1%
	2002	6,686,511	6,686,511	8%	8%
	2003	7,164,099	7,164,099	7%	7%
	2004	7,708,717	7,708,717	8%	8%
Forecast	2005	8,059,776	7,996,748	4.6%	3.7%
	2006	8,419,317	8,287,446	4.5%	3.6%
	2007	8,792,374	8,585,355	4.4%	3.6%
	2008	9,179,735	8,890,732	4.4%	3.6%
	2009	9,508,389	9,129,990	3.6%	2.7%
	2010	9,853,089	9,377,256	3.6%	2.7%
	2011	10,214,798	9,632,817	3.7%	2.7%
	2012	10,594,548	9,896,970	3.7%	2.7%
	2013	10,993,443	10,170,023	3.8%	2.8%
	2014	11,412,667	10,452,297	3.8%	2.8%
	2015	11,853,491	10,744,125	3.9%	2.8%
	2016	12,317,275	11,045,852	3.9%	2.8%
	2017	12,805,479	11,357,838	4.0%	2.8%
	2018	13,319,673	11,680,456	4.0%	2.8%
	2019	13,861,540	12,014,094	4.1%	2.9%
	2020	14,432,891	12,359,154	4.1%	2.9%
	CAGR	4.0%	3.0%		

Source: Maryland Port Administration

5.2 Port Land Use Development Zone Plans

The marine terminals comprising the Port of Baltimore are located in many different neighborhoods, each with its own development history and emerging development future. Truck and rail access to the marine terminals may, in some cases, be substantially affected by growth in non-marine terminal related traffic. Conversely, the ability to realize the highest and best land development futures in some neighborhoods may depend on the careful management of marine terminal truck and rail access. Finally, the ability to expand the capacity and operations of Port of Baltimore marine terminals to meet future market demand will depend in large part on how its land use and access needs are met within the larger overall land use context described in this section.

The public and private marine terminals and port and non-port related industrial lands in and adjacent to Port of Baltimore facilities typically fall within the Port Land Use Development Zone (PLUDZ). This designation was chartered by a 1998 State law and was directed by the Port Land Use Development Advisory Council (PLUDAC) which concluded its work in Fall, 2005. The Zone encompasses land three-thousand feet inland from selected waterfront areas in Anne Arundel and Baltimore counties and the entire shoreline of the City of Baltimore.

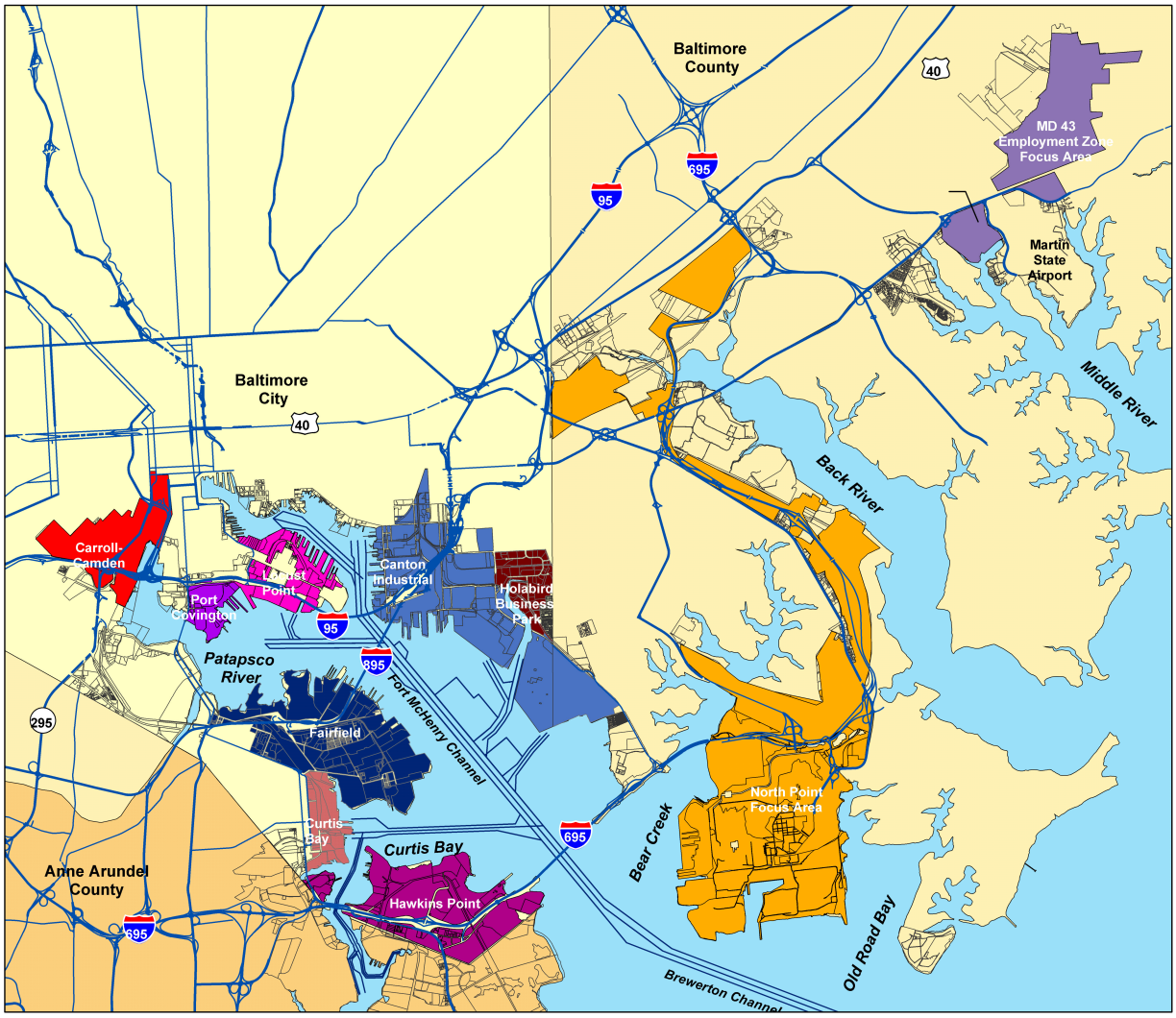
Within the Zone, there are several Port Focus Areas, as shown in Figure 7 on the following page. These include: Canton, Holabird, Locust Point, Fairfield, Curtis Bay, Hawkins Point and Carroll-Camden (Baltimore City); and the North Point Peninsula and MD 43 (Baltimore County). There are no Port Focus Areas within Anne Arundel County, but the Fairfield and Hawkins Point areas are immediately adjacent.

- The Carroll-Camden Area is bisected by Interstates 95 and 395, holds a combination of industrial, warehouse and office uses and is adjacent to redeveloping residential and entertainment districts. Water depths are not appropriate for Port use and there are no current Port of Baltimore facilities in the area.

- Land uses in the Locust Point Area are mixed and changing. Significant redevelopment has occurred, and new industrial businesses have moved into redeveloped properties while others have expanded their operations. Residential and commercial developments are also increasing the density of the neighborhood and Key Highway has been slated for extension to Hull Street to help alleviate increasing traffic congestion.

- Canton is the site of several major terminals such as Seagirt and Dundalk, along with other private operations. There are limited vacant land expansion opportunities within this Area, but a distinct redevelopment potential exists on the General Motors and Exxon sites. The rapidly gentrifying residential neighborhood of Canton lies to the northwest and just to the northeast is the O'Donnell Heights neighborhood which is targeted for redevelopment. The Holabird Focus Area just to the east of Canton is a reclaimed military facility with all of the parcels in the existing business park either developed or under proposal.

Figure 7. Port Focus Areas and Maritime Industrial District Boundaries



Source: PLUDAC, Maritime Industrial Retention and Growth Management Strategy, July 2005.

- The Fairfield Port Land Use Area has a long history of heavy industrial, petrochemical and automobile processing uses. There is direct freight rail access to the site and active redevelopment of fallow and recently assembled sites is underway. At Hawkins Point, the lack of public sewer service along with the existence of chemical manufacturers, active landfills and other contaminated lands limit the near-term redevelopment opportunities for this Area.

- Curtis Bay hosts import-export bulk commodity terminals, marine contractors, shipbuilders, asphalt plants and other water dependent uses. A major rail switching yard handles service for the Fairfield, Curtis Bay and Hawkins Point areas.

- The North Point Focus Area has a significant portion of developable land, due to become available within the near future. Industrial landowners have expressed a desire to dispose of underutilized property, a proposal that has already garnered interest from the development community. Redevelopment has brought salvage, distribution and warehousing operations that take advantage of the easy access to I-695/MD 695 and existing freight rail infrastructure. This area includes the marine terminals at Sparrows Point.

- Within the MD 43 Port Focus Area near White Marsh, construction is underway to complete the extension of MD 43 between Eastern Boulevard and Pulaski Highway (US 40). Completion of this road will create access to 600 acres of developable industrially zoned property. Developers already have plans in place for a combination of warehouse, flex space, office and ancillary retail space. Over 5.5 million square feet is expected to be built within the next 30 years. The Federal General Services Administration (GSA) also has announced it will sell the 1.9 million square foot Federal Depot building on Eastern Avenue. Development interest in this property is expected to be strong.

Preliminary forecasts predicted a need for 900,000 square feet of direct port facilities, 6.5 million square feet of warehouse space and 6.2 million square feet of flex space between 2001 and 2011 within the Zone, with a large majority of the demand located within the City of Baltimore. Appendix E presents additional data on built space, vacancy rates and average rents as quoted by PLUDAC in their November 2004 report.

Development of industrial space related to Port activities, as well as development of non-port related space, will generate additional traffic on the region's highways, and must be reflected in future transportation planning for the Port.

6.0 Current System Performance

6.1 Truck Network

6.1.1 Methodology

To characterize the current performance of the Port of Baltimore's truck access network, the study utilized multiple data sources to address four key questions:

- How well is the local road network serving Port of Baltimore terminals performing?
- How well is the regional and interstate highway network serving Port of Baltimore terminals performing?
- What volumes and types of trucks are serving Port of Baltimore terminals?
- What are the relative impacts and contributions of Port of Baltimore truck traffic with respect to these levels of performance?

6.1.2 Performance of the Local Road System

Traffic Counts

For selected roadway segments serving Port of Baltimore terminals, existing 24-hour traffic counts were compiled from available sources, and supplemented with new volume and classification counts. The counts and are reported in Appendix F. Table 5 on the following page presents a summary of weekday 24-hour counts in both directions, ranked by percentage of truck traffic. Truck counts include both Port and non-Port related truck traffic.

There is no specific truck percentage that represents a threshold of significant effect. Impacts depend largely on the design and capacity of the roadway, the neighborhood in which it is located, and the sizes and types of trucks using the road. For some roads truck percentages greater than 30% or more may be acceptable, while for other roads truck percentages greater than 5% may be unacceptable. Table 5 highlights truck percentages of 10% or more, which generally represent higher than average truck activity.

Table 5. Weekday 24-Hour Traffic Counts and Truck Percentages

Area	Segment	Counted At	All Vehicles	Trucks	Truck Pct.
Canton	Keith Ave	S of Clinton	12,331	1,969	**16%**
	Boston St	W of Ponca	15,079	1,519	**10%**
	Ponca St	S of O'Donnell	5,240	456	9%
	O'Donnell Cutoff	E of Interstate	11,135	349	3%
Curtis Bay	Pennington Ave	S of Aspen	12,865	2,149	**17%**
	Ritchie Hwy	S of Patapsco	22,176	890	4%
Fairfield	Chesapeake Ave	Bet. Shell/Vera	2,170	933	**43%**
	Vera St	N of	703	248	**35%**
	Shell Rd	S of Frankfurst	5,809	1,665	**29%**
	Frankfurst Ave	W of Childs	6,698	1,800	**27%**
	Potee/Hanover Sts	S of Waterview	24,669	4,434	**18%**
	Patapsco Ave	E of Hanover	11,574	2,022	**17%**
	Childs St	N of Frankfurst	1,477	178	**12%**
Hawkins Point	Quarantine Rd	N of Hawkins Pt	11,174	2,670	**24%**
	Chemical Rd	N of Hawkins Pt	2,377	527	**22%**
	Hawkins Pt Rd	E of Chemical	10,516	2,304	**22%**
Highlandtown	Ponca St	S of Lombard	13,120	1,369	**10%**
	Eastern Ave	W of Dundalk	28,330	1,807	6%
Locust Point	Hanover St	N of Cromwell	33,723	6,119	**18%**
	Key Hwy	Bet. McComas/Light	13,999	2,178	**16%**
	McComas St	E of Hanover	5,155	547	**11%**
	Andre St	N of Fort	1,757	142	8%
	Fort Ave	E of Hull	5,037	309	6%
Seagirt/Dundalk	Broening Hwy	S of Holabird	9,600	2,239	**23%**
	Holabird Ave	W of Broening	18,400	3,259	**18%**
	Dundalk Ave	N of Holabird	25,245	1,826	7%
Sparrows Point	MD 158	Bet. MD 151/Tin Mill	1,925	342	**18%**
	MD 151	W of Wharf	5,338	387	7%

Intersection Level of Service Analyses

The counts discussed above were the basis for level of service analyses. The standard methodologies used by traffic engineers to evaluate roadways and intersections are documented in the 2000 Highway Capacity Manual (HCM 2000)[8]. Based on these methodologies, the Maryland State Highway Administration (SHA) uses Critical Lane Volume analysis (CLV) methodology to estimate intersection level of service based on identification of the "critical volume." This critical volume spreadsheet, with inputs of turning movement volumes and lane groups, was used to evaluate 27 study area intersections.

As shown in Table 6 below, a letter grade is assigned to each critical volume threshold for intersections. Level of Service (LOS) A, B or C indicates that an intersection is operating under capacity with minor delays. Under LOS D, the intersection is operating near capacity and drivers experience longer delays. LOS E and LOS F indicate that the intersection is operating at or above capacity and drivers typically experience lengthy delays and queues. LOS D or better is generally considered acceptable in urbanized areas.

Table 6. Intersection Level of Service Thresholds, Critical Lane Method

Level of Service (LOS)	Critical Volume
A	$\leq$ 1,000
B	$\leq$ 1,150
C	$\leq$ 1,300
D	$\leq$ 1,450
E	$\leq$ 1,600
F	$\geq$ 1,601

Based on the CLV methodology, most of study area intersections are shown to be operating under capacity with a LOS A and v/c less than 0.60. Only one intersection has a v/c greater than 0.80 with the CLV analysis (Quarantine Road/MD 695 westbound ramps), and this location is already planned for improvement.

The methodology is used for planning level analysis and provides a general assessment of intersection operation. However, it does not address issues such as differences between trucks and automobiles, time of day differences, and other operational factors. To provide additional insight, these intersections were also analyzed using Highway Capacity (HCS) software[9] for planning level analysis.

[8] "Highway Capacity Manual – HCM 2000", Transportation Research Board, National Research Council, 2000.

[9] Highway Capacity Software (HCS) version 4.1, FHWA

Based on the HCS methodology, of the 27 intersections analyzed, only four would be considered over capacity (LOS E). Two of these intersections (Quarantine Road at MD 695, and Key Highway at Key Highway East) will benefit from currently planned improvements. Another (O'Donnell Street at Interstate Avenue) is not heavily used by trucks (truck represent only 2% to 5% of peak traffic, depending on direction and period). The one remaining intersection of potential concern is Quarantine Road at Hawkins Point Road.

Table 7. Intersections Over Capacity, HCS Methodology

Geographic Area	Intersection	Condition/Period
Seagirt/Dundalk	O'Donnell Street at Interstate Avenue*	Near in AM, Over in PM
Locust Point	Key Highway at Key Highway East	Over in AM
Hawkins Point	Quarantine Rd at Hawkins Point Rd**	Over in AM, Over in PM
	Quarantine Rd at MD 695 WB Ramp**	Over in AM, Near in PM

* Not heavily used by trucks.
** Planned for improvement, as shown in Figure 6 previously.

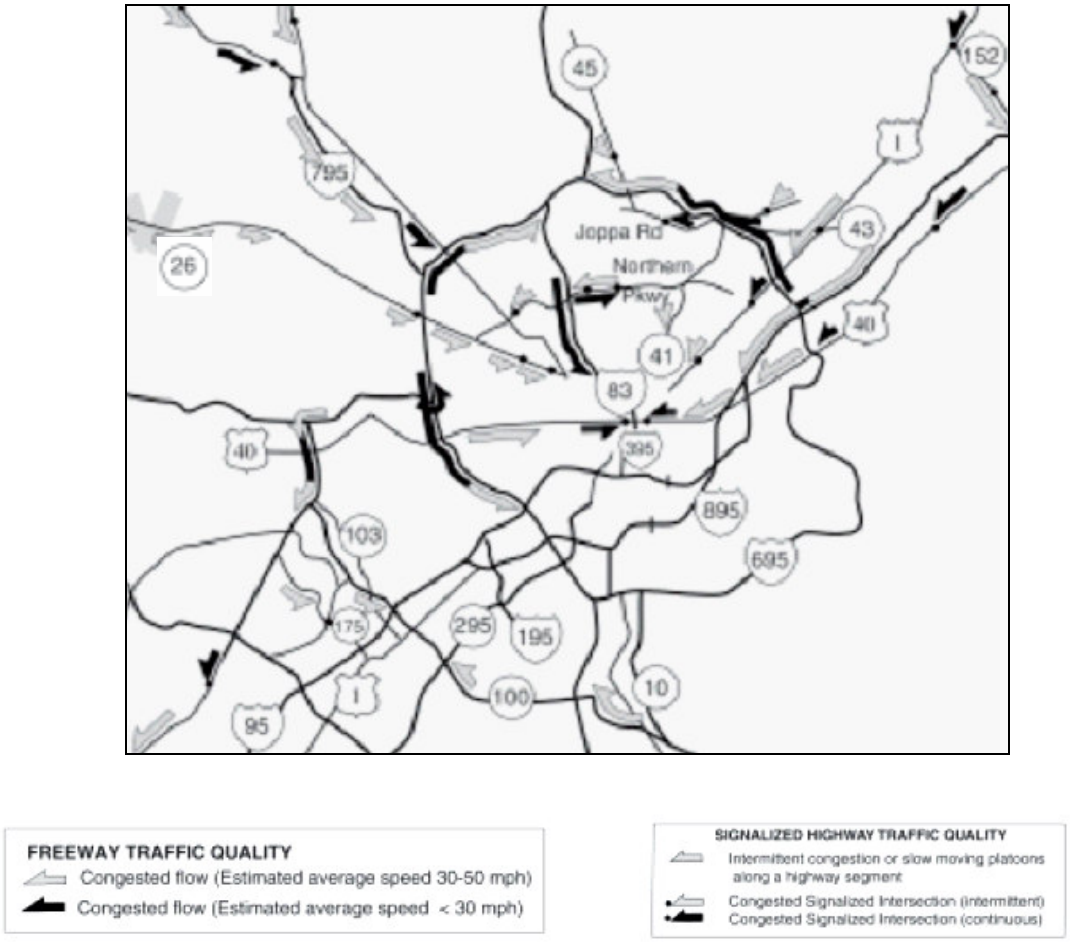
Detailed results from both methodologies -- including LOS, v/c ratios, and critical lane volumes -- are presented in Appendix F.

6.1.3 Performance of the Regional and Interstate Highway Network

Aerial Analysis of Travel Speeds

As part of the Baltimore Regional Transportation Board (BRTB) Transportation 2030 report, aerial images from year 2002 were analyzed to develop estimates of travel speed. The results are reproduced as Figure 8 on the following page. According to this analysis, segments of I-83, I-695, and other roads show average travel speeds of less than 30 miles per hour, but the majority of the system offers higher travel speeds.

Figure 8. Estimated Travel Speeds During Morning Peak, Year 2002

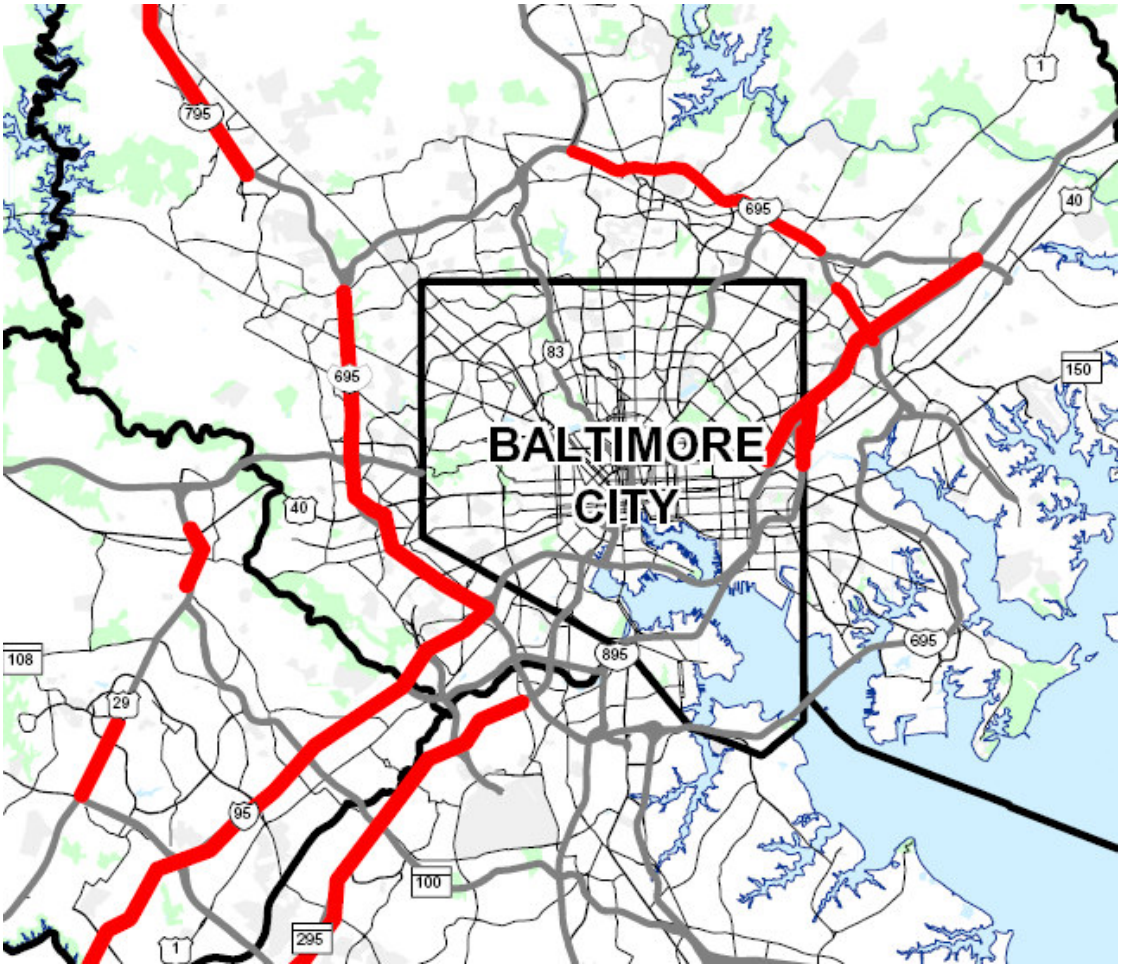


Source: BRTB, "Transportation 2030" Report

Transportation Model Level of Service Estimates

Figure 9 on the following page presents model output from the BRTB regional transportation model for year 2000 conditions. The model identifies segments where estimated demand exceeds estimated capacity (LOS E) for at least one hour per day. Major segments of I-95, I-695, MD 295, I-795 and other roads are noted as experiencing congested periods.

Figure 9. Roadways With LOS E for at Least One Hour Per Day, Year 2000



Source: BRTB, "Transportation 2030" Report

Supplemental Level of Service Analysis

The aerial analysis and model analysis provide somewhat different indicators, particularly for I-95. Since I-95 is heavily relied upon by Port of Baltimore truckers (as discussed later in this report), the consultant team performed additional analyses of morning peak hour conditions using year 2004 data. The section of I-95 from south of Caton Avenue to south of I-895 was analyzed for level of service using Highway Capacity System methods.[10] The detailed results are presented in Appendix F; in summary, the analysis found that while many segments show congestion (LOS D), only two segments – I-95 northbound below Caton Avenue and I-95 southbound above I-395 – operate at LOS E.

[10] Traffic planners have also noted that northbound AM peak traffic on Interstate 395 often backs up into the travel lanes of northbound Interstate 95.

Planned Improvements

Although different methods provide different results, it is clear that certain segments of the region's interstate highway system experience congestion. This has been the focus of major ongoing planning efforts at the City, regional, and State level. As previously noted in Figure 6, major improvements are under construction or planned to address congested segments of I-95 north and south of Baltimore City, I-695 west and north of Baltimore City, I-83 at I-695, and MD-295.

6.1.4 Characteristics of Truck Traffic Serving Port of Baltimore Terminals

Terminal Trip Generation

As a supplement to the roadway segment traffic counts summarized in Table 5, weekday traffic counts (machine and manual) were also taken at selected terminal gates. Terminal count dates are listed in Appendix B; terminal count locations are identified on the maps in Appendix C; key results are presented in Table 8 on the following page; and additional analysis of time-of-day patterns by terminal is presented in Appendix F.

The terminal counts identified 9,463 weekday truck moves to/from Port of Baltimore terminals. Over a 9-hour operating day, this represents an average of around 1,000 trips per hour – 500 inbound and 500 outbound. Geographically, the majority of trips were associated with the Seagirt-Dundalk (4,072), Canton (1,786), and Locust Point (1,373) areas. Among individual terminals, the leading generators of daily truck traffic were Dundalk (1,876), Seagirt (1,839), Rukert Terminals (1,294) and North Locust Point (1,047).

As shown in Figure 10 following, trucks associated with Seagirt, Dundalk, and the Seagirt ICTF tend to operate primarily between 7AM and 5PM, with inbound volumes peaking between 9 and 10 AM and outbound volumes peaking between 2 and 3 PM. Truck activity for other terminals tends to be more evenly distributed throughout these hours. Overall, this means that there are less Port of Baltimore trucks traveling in the commuter peak hours (when highways are most congested) than in the midday hours (when highways are less congested).

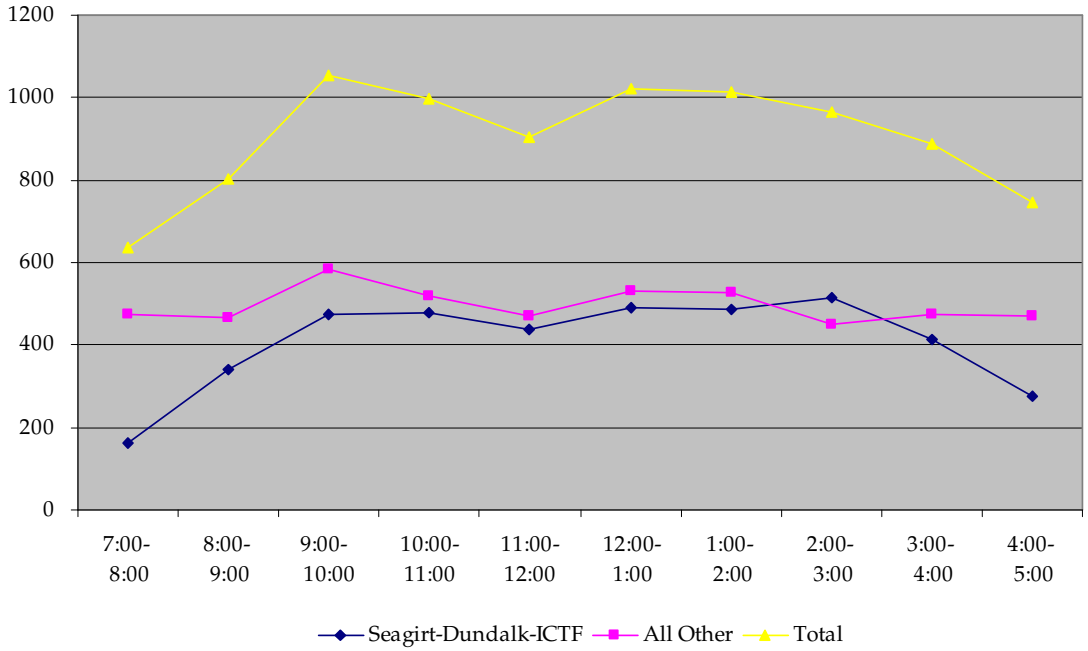
While not every terminal gate was counted, but the effects of all terminal trucks are represented in the roadway segment traffic counts. In some cases, taking counts that isolated marine terminal trucks from other traffic proved logistically difficult; in other cases, terminals were observed to generate relatively low levels of truck traffic compared to more active terminals. Also, it was observed that some private terminals generated limited additional truck trips before 7 AM and after 5 PM.

If we assume that the terminal counts captured approximately 75% of Port of Baltimore trips, total Port of Baltimore weekday truck moves would be around 12,500 per day. Given the available resources for this study, it was not possible to count every terminal, but such an effort is worth consideration in the future.

Table 8. Weekday Truck Trips To/From Selected Terminals

ID		Inbound	Outbound	Total
Seagirt-Dundalk				
5	Dundalk Marine Terminal (MPA)	913	963	1,876
6	Seagirt Marine Terminal (MPA)	879	960	1,839
7	Seagirt Intermodal ICTF (MPA)	189	168	357
		1,981	2,091	4,072
Canton				
9	National Gypsum	166	191	357
13, 14, 16, 17, 19	Rukert Terminals	661	633	1,294
15	Lehigh Portland Cement	67	68	135
		894	892	1,786
Locust Point				
25	Domino Sugar	88	95	183
27	North Locust Point (MPA)	537	510	1,047
29	South Locust Point (MPA)	64	79	143
		689	684	1,373
Fairfield				
31	Masonville Marine Terminal (MPA)	55	49	104
32	Fairfield Auto Terminal (MPA)	26	35	61
33	Atlantic Terminals	31	31	62
36	Chesapeake Terminal	52	65	117
		164	180	344
Curtis Bay				
43	Amerada Hess	192	223	415
Hawkins Point				
45	U.S. Coast Guard Yard	40	39	79
47	WR Grace/Davison Chemical	70	83	153
48	U.S. Gypsum Dock	137	139	276
		247	261	508
Sparrows Point				
1	Pennwood Wharf (Mittal)	110	96	206
2	Mittal Steel Ore Pier	149	115	264
4	Baltimore Marine Industries, Inc.	56	147	203
		315	358	673
Highlandtown				
22	Belt's Business Center	74	76	150
23	NS Bayview Intermodal Yard	75	67	142
		149	143	292
TOTAL COUNTED		**4,631**	**4,832**	**9,463**

Figure 10. Time of Day Distribution for Port of Baltimore Trucks



Port of Baltimore Trip Purpose and Trip Distribution

To provide general information regarding where these trips are coming from and going to, and by what routes, and for what purpose, a program of one-day weekday trucker surveys was conducted at five major Port of Baltimore terminals with high trip generation characteristics. This survey was not intended to develop a fully representative sample accurately reflecting the Port's overall distribution of trip generation by geographic location and commodity type. Such an effort, while potentially extremely useful, was substantially beyond the capability of this study.

At each location, written surveys were distributed to inbound truckers at the terminal entrance gates; completed surveys were collected at the exit gates. As an incentive for completing the survey, the on-site survey team offered truck operators a raffle ticket for three cash prizes. The survey instrument (see Appendix G) was a single page paper copy of 16 (mostly) multiple-choice questions. Surveys were administered at Seagirt and Dundalk in March 2005, and at Rukert, Steinweg, and North Locust Point in March and April of 2005. A total of 1,172 responses were completed; these representing 2,410 daily trips, reflecting the fact that many respondents reported making multiple trips per day. The sample captured nearly 60% of Seagirt and Dundalk trips, but less than 20% of Rukert/Steinweg/North Locust Point trips.

Key results for the entire survey population are summarized in Tables 9 and 10 and Figures 11 and 12 on the following pages. The two samples (Seagirt/Dundalk versus Rukert/Steinweg/North Locust Point) showed interesting differences, and Appendix H discusses these differences in greater detail.

For inbound trips, around 78% are coming from in-region origins, with 61% from Baltimore City and the Port area; these local truckers are generally making multiple trips per day. Around 22% are coming from out-of-region origins, primarily via I-83, I-70, and I-95. Almost all out-of-region truckers use I-95 and/or I-695/MD 695 as their primary or secondary access route. Container trucks can arrive loaded or empty, but non-container trucks generally arrive empty. Around 50% of Seagirt trips originate from warehouses; for other terminals, origins are evenly split between warehouses, shippers, and factories/farms/other. Between 0% and 10% of trips are coming from railyards.

Table 9. Summary of One-Day Trucker Survey Results, Inbound Trips

	Responses						Associated Trips		
	Dundalk	Seagirt	Rukert	N. Locust	Steinweg	Total	Number of Trips	Share of Trips	Trips/Day/ Respondent
Origins In-Region	**136**	**175**	**24**	**23**	**7**	**365**	**944**	**78%**	**2.6**
Baltimore City/Port	*96*	*111*	*12*	*12*	*3*	*234*	*740*	*61%*	3.2
Baltimore Region	*40*	*64*	*12*	*11*	*4*	*131*	*204*	*17%*	1.6
Origins Out of Region	**95**	**91**	**14**	**19**	**8**	**227**	**270**	**22%**	**1.2**
I-70	*32*	*30*	*6*	*4*	*2*	*74*	*71*	*6%*	1.0
I-83	*33*	*37*	*3*	*6*	*1*	*80*	*113*	*9%*	1.4
I-95 N	*15*	*14*	*3*	*5*	*4*	*41*	*52*	*4%*	1.3
I-95 S	*10*	*4*	*1*	*1*	*0*	*16*	*22*	*2%*	1.4
I-495 (VA)	*5*	*5*	*1*	*3*	*1*	*15*	*11*	*1%*	0.7
E. Shore	*0*	*1*	*0*	*0*	*0*	*1*	*1*	*0%*	1.0
Origins Total	**231**	**266**	**38**	**42**	**15**	**592**	**1214**	**100%**	**2.1**
Loaded	*41%*	*51%*	*24%*	*17%*	*20%*	--	--	--	--
Empty	*59%*	*49%*	*76%*	*83%*	*80%*	--	--	--	--
From Warehouse	*35%*	*49%*	25%	20%	33%	--	--	--	--
From Shipper/Receiver	*26%*	*26%*	28%	36%	40%	--	--	--	--
From Railyard	*4%*	*5%*	10%	6%	0%	--	--	--	--
From Factory or Other	39%	*25%*	37%	37%	27%	--	--	--	--
Reported Using I-95 for all/part	*340*			*90*		--	--	--	--
Reported Using I-695/MD 695 for all/part	*199*			*52*		--	--	--	--
Reported Not Using I-95, I-695, MD 695	*20*			*2*		--	--	--	--

For outbound trips, around 78% are going to in-region destinations, with 62% to Baltimore City and the Port area; these local truckers are generally making multiple trips per day. Around 22% are going to out-of-region destinations, primarily via I-83, I-70, and I-95. Almost all out-of-region truckers use I-95 and/or I-695/MD 695 as their primary or secondary access route. More container trucks leave loaded than empty, and significantly more non-container trucks leave loaded than empty. Around 47% of Seagirt trips are destined for warehouses; for other terminals, destinations are relatively evenly split between warehouses, shippers, and other. Between 0% and 6% of trips go to railyards.

Table 10. Summary of One-Day Trucker Survey Results, Outbound Trips

	Responses						Associated Trips		
	Dundalk	Seagirt	Rukert	N. Locust	Steinweg	Total	Number of Trips	Share of Trips	Trips/Day/ Respondent
Destinations In-Region	**119**	**193**	**5**	**6**	**3**	**326**	**935**	**78%**	**2.9**
Baltimore City/Port	*91*	*132*	*2*	*4*	*1*	230	*738*	*62%*	*3.2*
Baltimore Region	*28*	*61*	*3*	*2*	*2*	*96*	*197*	*16%*	*2.1*
Destinations Out of Region	**103**	**72**	**32**	**35**	**12**	**254**	**261**	**22%**	**1.0**
I-70	*43*	*28*	*14*	*12*	*5*	*102*	*91*	*8%*	*0.9*
I-83	*31*	*27*	*9*	*9*	*2*	*78*	*95*	*8%*	*1.2*
I-95 N	*17*	*8*	*6*	*2*	*2*	*35*	*42*	*4%*	*1.2*
I-95 S	*10*	*3*	*3*	*6*	*1*	*23*	*19*	*2%*	*0.8*
I-495 (VA)	*1*	*2*	*0*	*5*	*2*	*10*	*7*	*1%*	*0.7*
E. Shore	*1*	*4*	*0*	*1*	*0*	*6*	*7*	*1%*	*1.2*
Destinations Total	**222**	**265**	**37**	**41**	**15**	**580**	**1196**	**100%**	**2.1**
Loaded	*61%*	*62%*	*89%*	*93%*	*100%*	--	--	--	--
Empty	*39%*	*38%*	*11%*	*7%*	*0%*	--	--	--	--
To Warehouse/Distribution	*38%*	*47%*	*21%*	*41%*	*33%*	--	--	--	--
To Shipper/Receiver	*29%*	*24%*	*26%*	*29%*	*33%*	--	--	--	--
To Railyard	*4%*	*6%*	*3%*	*2%*	*0%*	--	--	--	--
To Factory or Other	32%	*29%*	*50%*	*27%*	*33%*	--	--	--	--
Reported Using I-95		*309*		*88*		--	--	--	--
Reported Using I-695/MD 695		*204*		*48*		--	--	--	--
Did Not Use I-95, I-695, MD 695		*24*		2		--	--	--	--

Figure 11. Origins of Inbound Truck Trips Surveyed

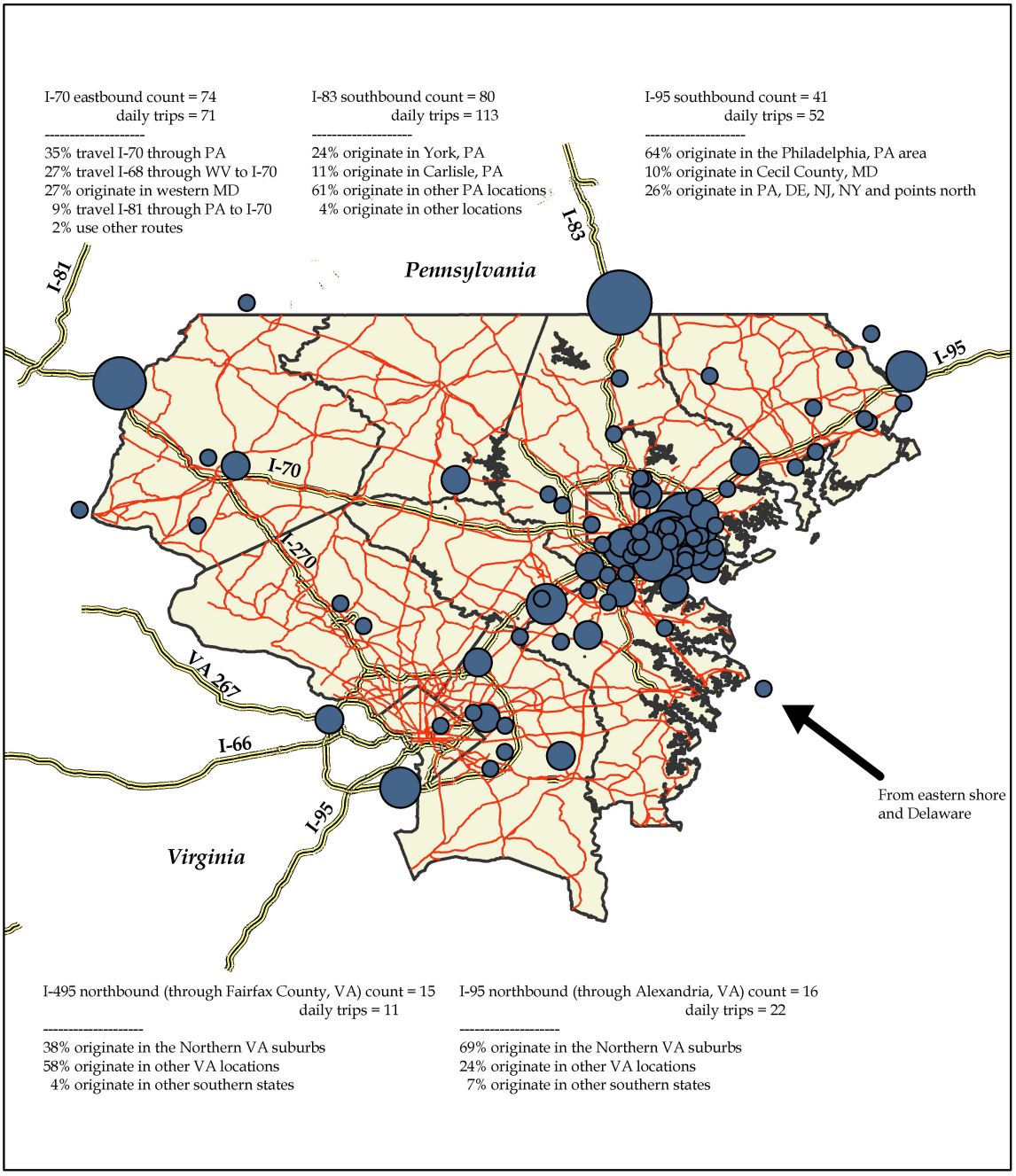
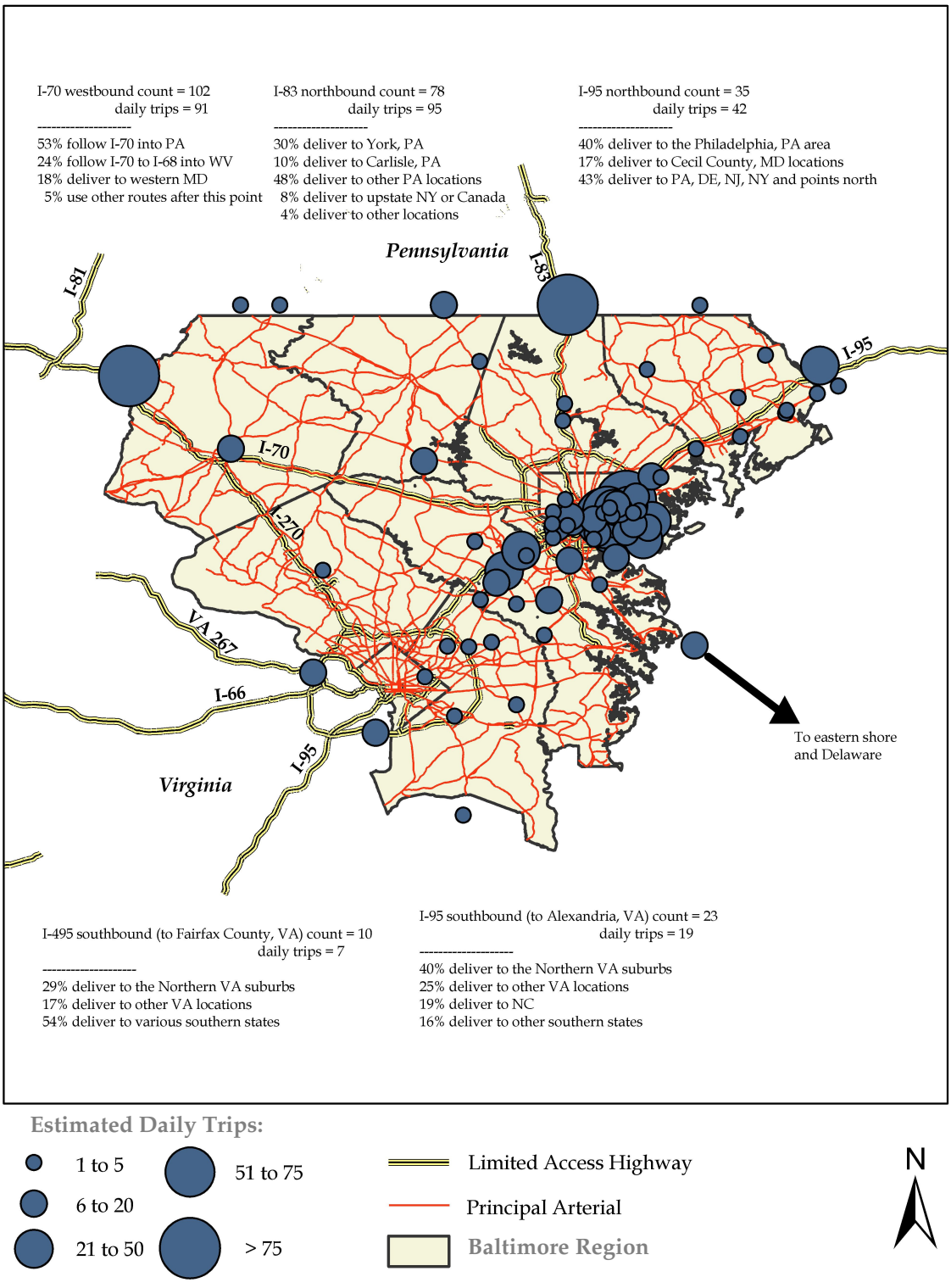


Figure 12. Destinations of Outbound Truck Trips Surveyed



6.1.5 Effects of Port of Baltimore Trucks on Local and Regional Networks

Port of Baltimore Terminal Contributions to Local Traffic

Port of Baltimore terminals operate within the larger metropolitan region, and share port access roads with non-port trucks as well as automobile traffic. Data collected for this study did not allow for quantification of how many port versus non-port trucks were operating on each roadway link. However, comparing the total trucks counted in a given area (from Table 5) with the Port of Baltimore terminal trip generation in a given area (from Table 8) provides a useful general indicator (see Table 11 on the following page).

In areas where Port of Baltimore truck trip generation is high compared to total truck counts, it can be assumed that Port trucks represent a high percentage of local truck traffic; where Port of Baltimore truck trip generation is low compared to total truck counts, the opposite can be assumed.

- Areas where Port of Baltimore trucks appear to represent a higher share of total trucks: Seagirt/Dundalk, Canton, Locust Point, and Sparrows Point.

- Areas where Port of Baltimore trucks appear to represent a moderate share of total trucks: Curtis Bay, Hawkins Point, and Fairfield. While terminals in the Fairfield area generate relatively low truck volumes, the area also accommodates some share of traffic associated with Curtis Bay and Hawkins Point to the south.

- Areas where Port of Baltimore trucks appear to represent a lower share of total trucks: Highlandtown.

As previously noted, gate counts captured an estimated 75% of Port truck trips, so the possible effect of terminals that were not counted should be considered when interpreting these results.

Also, again as previously noted, the only local intersection currently of potential concern is Quarantine Road at Hawkins Point Road, an areas where Port of Baltimore trucks appear to represent a moderate share of total trucks.

Table 11. Total Truck Trips Compared to Port of Baltimore Truck Trips

Area	Segment	Total Weekday Truck Counts	Weekday Truck Counts for Port of Baltimore Terminals in Area
Higher Share of Area Trucks Associated with Port of Baltimore			
Seagirt/Dundalk	Broening Hwy	2,239	4,072
	Holabird Ave	3,259	
	Dundalk Ave	1,826	
Canton	Keith Ave	1,969	1,786
	Boston St	1,519	
	Ponca St	456	
	O'Donnell Cutoff	349	
Locust Point	Hanover St	6,119	1,373
	Key Hwy	2,178	
	McComas St	547	
	Andre St	142	
	Fort Ave	309	
Sparrows Point	MD 157	342	673
	MD 151	387	
Moderate Share of Area Trucks Associated with Port of Baltimore			
Hawkins Point	Quarantine Rd	2,670	508
	Chemical Rd	527	
	Hawkins Pt Rd	2,304	
Curtis Bay	Pennington Ave	2,149	415
	Ritchie Hwy	890	
Fairfield	Chesapeake Ave	933	344
	Vera St	248	
	Shell Rd	1,665	
	Frankfurst Ave	1,800	
	Potee/Hanover Sts	4,434	
	Patapsco Ave	2,022	
	Childs St	178	
Lower Share of Area Trucks Associated with Port of Baltimore			
Highlandtown	Ponca St	1,369	292
	Eastern Ave	1,807	

Port of Baltimore Terminal Contributions to Regional Traffic

Collectively, the five terminals that were subject to trucker surveys generate approximately 6,000 truck trips per day. The surveys provide origin-destination percentages that can be applied to this number of trips to estimate the volume of Port of Baltimore trucks at key count locations on Maryland's highway system. Assuming 5-day/52-week operations, these 6,000 truck trips project to 1,560,000 annual truck trips. Table 12 below shows the weighted distribution of these projected trips according to their reported use of routings associated with out-of-region corridors (I-70, I-83, I-95 N, I-95 S, I-495 VA and the Eastern Shore), and their estimated use (based on reported routings) of the Key Bridge, Harbor Tunnel, Fort McHenry Tunnel, and JFK Memorial Highway.

Total Port of Baltimore truck traffic from all terminals has been estimated at around 12,000 trips per day. No conclusions can be drawn for the estimated 6,000 trips per day (or 1,560,000 per year) that were not addressed by trucker surveys. Additional surveys at other terminals would be needed to develop origin-destination data for these trips.

For purposes of comparison, Table 12 also shows truck counts published by the Maryland Transportation Authority for Key Bridge, Harbor Tunnel, Fort McHenry Tunnel, JFK Memorial Highway.

Table 12. Estimated Port of Baltimore Truck Trips on the Regional Network

MdTA Counts, 2004	Total Vehicles	Truck Mode Share	Number of Trucks
Key Bridge	11,910,668	10.6%	1,262,531
Fort McHenry Tunnel	42,243,627	8.9%	3,759,683
JFK Memorial Highway	29,798,356	12.8%	3,814,190
Port of Baltimore Trucks, Projected 2005		**Percent of Trucks**	**Number of Trucks**
Port of Baltimore, Surveyed Terminals		100%	1,560,000
Estimated Key Bridge Share	--	*5.6%*	*86,803*
Estimated Fort McHenry Tunnel Share	--	*21.7%*	*338,520*
Estimated JFK Memorial Highway Share	--	*4.3%*	*66,607*
Reported I-70 out of region	--	*7.1%*	*111,330*
Reported I-83 out of region	--	*8.8%*	*137,062*
Reported I-95 N out of region	--	*4.3%*	*66,607*
Reported I-95 S out of region	--	*1.8%*	*28,673*
Reported I-495 (VA) out of region	--	*0.9%*	*14,359*
Reported Eastern Shore	--	*0.3%*	*5,153*
Port of Baltimore, Other Terminals	--	100%	1,560,000

The information in Table 12 suggests that:

- The surveyed Port of Baltimore terminals account for: around 86,000 annual truck moves (out of 1,263,000) on the Key Bridge; around 339,000 (out of 3,760,000) in the Fort McHenry Tunnel; and around 67,000 (out of 3,184,000) on the JFK Memorial Highway. Surveyed Port of Baltimore trucks represent a relatively low share of truck traffic on the Key Bridge and JFK, but a meaningful share of truck traffic in the Fort McHenry Tunnel.

- Once more, we see the importance of the I-83 and I-70 corridors in accommodating out-of-region Port of Baltimore truck trips. Looking only at surveyed terminals, I-83 carries more than 500 Port trucks per day, and I-70 carries more than 400 Port trucks per day.

Again, these figures do not account for truck traffic associated with terminals that were not surveyed.

6.2 Rail Network

6.2.1 Methodology

To characterize the current performance of the Port of Baltimore's rail access network, the study utilized multiple data sources to address four key questions:

- What is the system utilization by line?

- What types of commodities are being handled?

- What origins and destinations are being served?

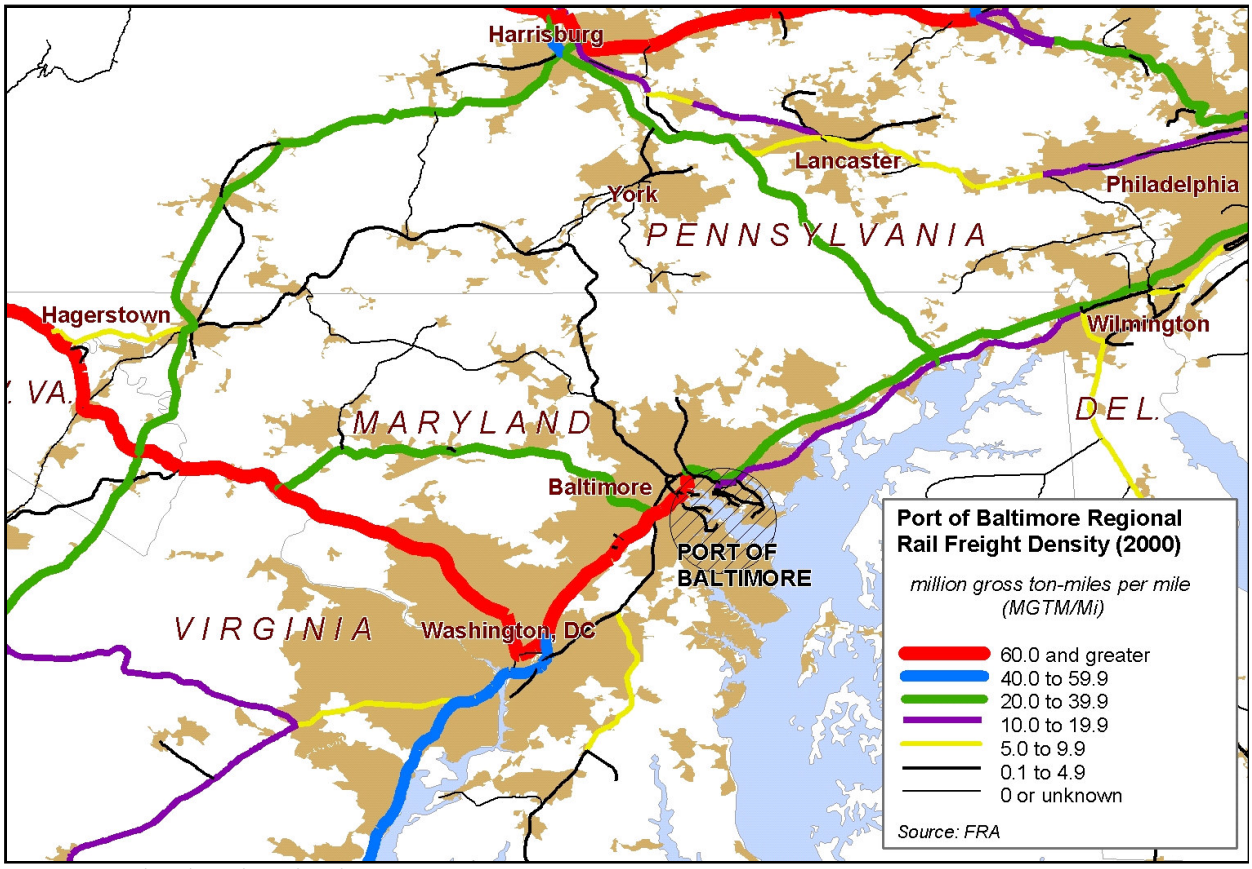
6.2.2 Rail Line Utilization

The Surface Transportation Board Waybill Sample is an annual Federal report of rail tonnages by commodity type, published at an aggregate level for general planning purposes and public release. Sampled data is assigned to the national rail network by a modeling process, for purposes of illustration. Summaries of this assigned sample data are presented in Figures 13 and 14 on the following pages.

From the FRA data, it appears that the largest tonnage flows are experienced on the CSX line that runs between Baltimore and Washington DC; at Washington, the line splits, with a western branch (through Hagerstown) and a southern branch (through Richmond). Much of the traffic on this line is Appalachian coal arriving into the Port of Baltimore, but the line also accommodates a mix of other inbound as well as outbound commodities.

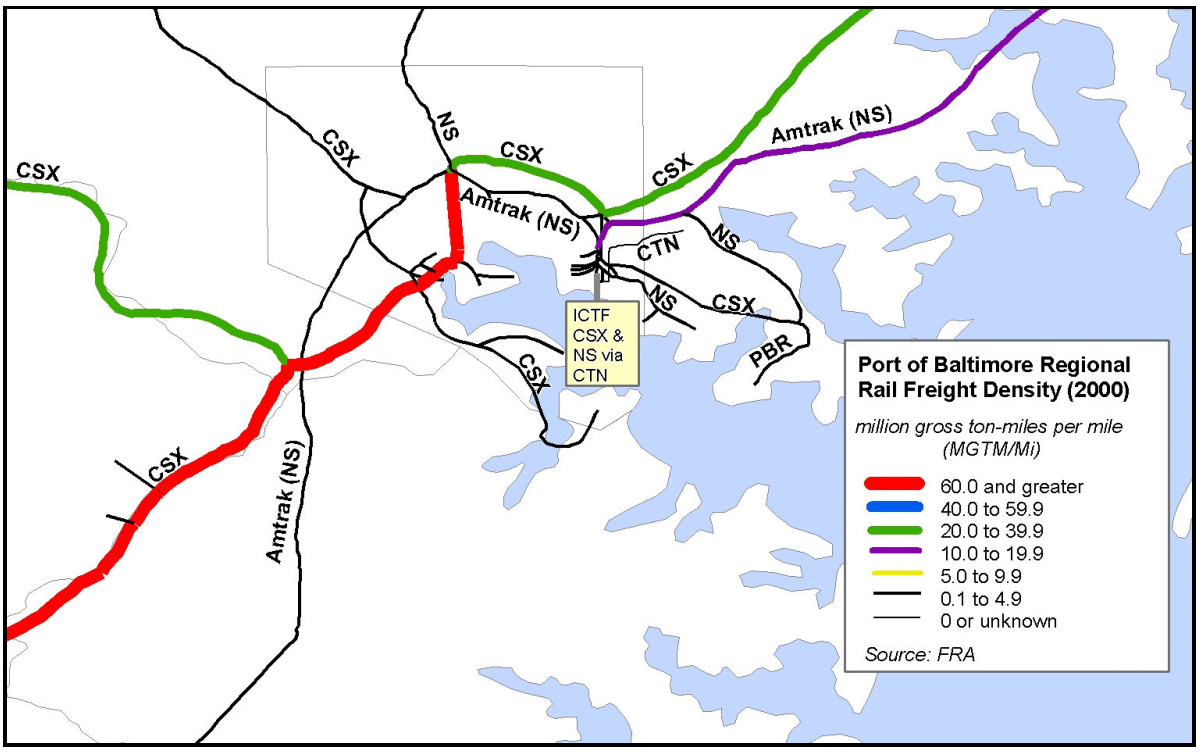
Lower tonnages are seen on the CSX line running west (which subsequently joins the CSX line through Hagerstown) and the CSX line running north from Baltimore. Still lower tonnages are seen on the NS lines, which serve the Port of Baltimore via access rights over the Canton Railroad, Amtrak's Northeast Corridor, and CSX.

Figure 13. Regional Rail Freight Density (2000)



Source: Federal Railroad Administration

Figure 14. Local Rail Freight Density (2000)



Source: Federal Railroad Administration

6.2.3 Rail Commodities and Services

The Port of Baltimore is primarily a local and regional distribution Port, serving a "freightshed" consisting mostly of customers within 500 to 1,000 miles. Because short-haul (500 miles of less) shipment costs for rail generally exceed those for truck, especially for goods that are high in value or require rapid distribution (such as automobiles), the truck mode share is much greater than the rail mode share of landside freight movements to and from the Port. Notwithstanding, the landside modal split between rail and truck varies by commodity. In the category of heavy tonnage commodities, such as coal, rock, and agricultural bulk shipments, rail continues to predominate landside movements of Port cargo.

Interviews with Port stakeholders provide some additional insight to the volumes and commodities of rail cargo at the Port. The following paragraphs summarize current commodity and volume information provided by the interviewees.

Coal and Dry Bulk

CSXT's Coal and Ore Piers receive 100% of 4 million annual tons of coal, limestone, and feed corn shipments by rail (and then transload to ship). This facility has seen significant

growth in tonnage in recent years, up from 2.5 to 3 million annual tons in previous years. The growth, fueled by China's burgeoning demand for power, is expected to continue in the future. The Baltimore Metals and Commodities terminal utilizes rail for 10% of its landside distribution of imported break bulk cargoes (20,000 tons each year by rail).

Chemicals and Liquid Bulk

The chemical industry also relies heavily on rail service to the Port. Liquid Transfer Terminals (Pennington) utilizes rail for approximately 20% of its outbound shipments of paraffin wax. The terminal also receives and ships caustic soda, and molasses and occasionally the terminal receives molasses by rail. The terminal generates approximately one outbound rail tanker car of paraffin wax each day to manufacturers of candles (Candlelite) and paper products (Sweetheart Cup). Occasionally, the terminal receives molasses by rail, however, most of the inbound movement to the terminal is by ship.

The Westway Terminal Company's North Locust Point facility receives 15% of its bulk liquid commodities by rail, including molasses, caustic soda, fertilizer, and other liquids. The facility uses truck exclusively for outbound shipments.

Another bulk liquid distributor, ST Services, receives liquid sugar by rail (outbound by truck) and ships a small amount of fuel and jet fuel by rail. Overall, ST generates between 8 to 16 inbound and outbound railcars each day.

W.R. Grace receives several types of chemicals to its manufacturing campus by rail. All of W.R. Grace's finished chemical products are shipped as inputs to manufacturers. The company ships some finished products by rail, including silica gel (paint, toothpaste, anti-caking agents) and chemical catalysts used by petroleum refineries and plastic manufacturers.

Intermodal and RoRo

American RoRo Carrier's Dundalk Marine Terminal operations utilize rail for approximately 20% of inbound (export) shipments. Its chief commodities are household goods and automobiles for overseas U.S. military and federal employees. Evergreen, a Taiwan-based container line, ships 96% of its containers by truck with the remaining 4% split between rail (NS) and barge. Atlantic Container Line uses rail to ship its RoRo cargo. For Atlantic, rail comprises 10% of its outbound shipments, with trucks representing the other 90%. Columbia Coastal utilizes rail for a portion of its container moves from the Dundalk Marine Terminal. However, the company ships by truck for most of its shipments, especially to regional customers.

AMPORTS utilizes rail for approximately one percent of its import auto shipments from its Atlantic Terminal. Most of these rail shipments are long haul moves to the West Coast or other distant North American locations. (AMPORTS does not utilize rail from its Chesapeake and Dundalk terminal operations).

While the Seagirt ICTF provides the capability for near-dock transfer of containers to and from rail, the great majority of its traffic is actually domestic, and not Port-related.

Other Commodities

Baltimore Forest Products (South Locust Point Marine Terminal) utilizes NS and CSXT for 50% and 60% of its paper and pulp shipments, respectively.

6.2.4 Rail Origins and Destinations

The following table summarizes the responses of interview participants with regard to origin and destination patterns. The table includes commodities moved by rail for at least a portion of the beginning-to-end trip and represents a sample of the commodities moved through the port via rail. Most outbound rail commodities arrive by water, including barge and ship; some arrive via rail or pipeline.

Table 13. Origin and Destination Patterns of Rail Commodities

Commodity	Direction	Origin	Destination
Coal	Inbound	Western Maryland, Virginia, Pennsylvania, West Virginia	International; China
Autos and personal effects of military personnel	Inbound and outbound	Domestic U.S.	International; Germany etc.
Paraffin wax	Inbound	China	Regional & Domestic U.S.
Furniture (containerized)	Outbound	China	Regional & Domestic U.S.
RoRo (machinery)	Outbound	Overseas	Regional & Domestic U.S.
Automobiles	Outbound	Overseas	Regional & Domestic U.S.
Molasses	Outbound	South America and E. Europe	Regional & Domestic U.S.
Liquid sugar	Outbound	Overseas, Domestic U.S.	Regional & Domestic U.S.
Fuel (including jet fuel)	Outbound	Overseas, Domestic U.S. (via pipeline)	Regional & Domestic U.S.
Caustic soda	Outbound	Canada, North America	Regional & Domestic U.S.
Chemicals and allied products	Outbound	Overseas; some manufactured in Baltimore	Domestic U.S and international
Wood pulp	Outbound	Brazil	Pennsylvania and New England states
Paper	Outbound	Finland	Domestic U.S. except Southeast

7.0 Near-Term Needs

7.1 Overview

This section of the report addresses the following questions:

- What near-term needs (generally within a five-year timeframe) can be identified?
- Which are being met or will be met by established transportation plans?
- What additional issues should be evaluated for potential action?

Truck and rail access are addressed separately.

7.2 Truck-Related Needs

7.2.1 Capacity

As discussed in Section 6 of this report, several intersections in the Port area will benefit from planned improvements, leaving only one local intersection -- Quarantine Road at Hawkins Point Road – as a potential concern in the near-term.

Portions of the regional highway network with current congestion issues were also identified, and while these segments will benefit from planned improvements, the timing of these improvements is not fully established. However, as noted in Figure 6 previously, most of these projects are either under construction, planned for construction by 2007, or undergoing engineering design or preliminary planning.

7.2.2 Local Access Conditions, Operations, and Connections

Building on the capacity analyses, the consultant team conducted a series of field observations of local access roads with the goal of identifying potential needs with respect to roadway conditions, operations, and connections.

Seagirt/Dundalk

The major truck travel routes in the Dundalk/Seagirt terminals area are Broening Highway, Holabird Avenue and Keith Avenue. These roadways carry between 10,000 and 25,000 vehicles daily and serve many major terminals and industrial activity centers. Traffic counts on these three roadways show that truck traffic comprises about 20% of daily traffic, with peak hour truck volumes varying between 100 and 200 trucks per hour.

There is currently no direct connection from Keith Avenue to northbound Broening Highway . Such a connection would help improve truck circulation in the area and accommodate future growth, including future redevelopment of the General Motors property, which is north of Keith Avenue and bisected by Broening Highway. This connection is planned under the BRTB Transportation 2030 Plan (item #12 on Figure 6).

The following observed conditions may warrant further investigation:

- Pavement issues were observed along Newgate Avenue between New Vail and Newkirk Streets, where railroad tracks create an uneven pavement surface.
- Signal timing at the intersection of Keith Avenue and New Vail Street.
- Signal timing at the Broening Highway entrance to the Point Breeze Business Center and at the Seagirt Terminal gate.
- Pavement conditions on Broening Highway southbound between Keith Avenue and the Seagirt Terminal gate entrance.
- Pavement conditions on Broening Highway at the interface with the bridge over Colgate Creek between Seagirt and Dundalk Terminals, where the roadway surface on Broening Highway has settled on either side of the bridge creating a rough interface between the roadway and the deck.
- Operation of the northbound Interstate 95 exit ramp to Keith Avenue, involving weaving conflicts between exiting passenger vehicles at the Keith Avenue interchange and through truck traffic on I-95, and between truck traffic at the Keith Avenue interchange and through passenger vehicles on I-95.

Canton

In this area, the I-95 and I-895 highway ramps serve both the Port activities and the general land uses of the area. Traffic volumes are generally high, although on the roadways further from the Port (Eastern Avenue, O'Donnell Street, Ponca Street north of Eastern, and Boston Street west of Ponca Street) trucks comprise about 10% of the traffic, generally less than 100 trucks per peak hour. Closer to the terminals on the waterfront, truck volumes are higher than in the area north of Boston Street. Along Holabird Avenue and Keith Avenue, trucks comprise about 20% of the daily traffic including 100 to 200 trucks per peak hour.

Due to a bulkhead failure in December 2003, Clinton Street south of Holabird Avenue has been closed. In order for trucks at the intersection of Boston Street and Clinton Street to reach the terminals south of the closure, they must detour taking Boston Street east through the Ponca Street intersection to I-95 southbound to Keith Avenue westbound and then back to Clinton Street. Repairs to Clinton Street are scheduled to be completed no later than December, 2006.

The following observed conditions may warrant further investigation:

- There are numerous issues on Boston Street. First, the intersection of Ponca Street and Boston Street / Interstate Avenue is a four-way, signalized intersection with Ponca Street crossing in the north-south direction, Interstate Avenue to the east and Boston Street to the west. While Interstate Avenue has two travel lanes in each direction, Boston Street has only one lane in each direction west of Ponca Street. Second, an active Canton Railroad at-grade crossing just to the west of Ponca Street is used for short, slow train movements, causing traffic queues on both directions of Boston Street. Third, northbound Ponca Street offers two travel lanes at Boston Street/Interstate Avenue; traffic turning right to access interstate highway ramps must queue. Fourth, southbound Ponca Street provides constrained turning radii.

Locust Point

The Locust Point North and Locust Point South terminal areas are adjacent to the Locust Point neighborhoods and Fort McHenry National Monument and Historic Shrine. In this area, Key Highway and Hanover Street have the highest truck volumes with about 100 – 150 trucks per peak hour or 10 – 12 percent of total volume. McComas Street, Fort Avenue and Andre Street have peak hour truck volumes less than 50. While the daily truck trips comprise typically less than 15% of the daily traffic, the adjoining land uses include retail and residential areas that are more sensitive to truck related activity.

Capacity issues were identified for the intersection of Key Highway and Key Highway East, but the proposed connection of Key Highway East to Hull Street using existing rail right-of-way (see project #6 on Figure 5) should offer the opportunity to address this issue. Otherwise, no observed conditions appear to warrant further investigation.

Fairfield

Major truck routes in this area are Patapsco Avenue, Hanover Street, Frankfurst Avenue and Chesapeake Avenue. Peak hour truck volumes along these routes generally vary between 100 and 200 trucks per peak hour and comprise 20% – 40% of the daily traffic. Although peak hour truck volumes along Hanover Street at Potee Street, near the I-895 ramps, are higher at about 200 – 300 trucks per hour. Recent reconstruction of the intersection of Patapsco, Curtis and Pennington Avenues should result in improved circulation for all vehicles. Recent reconstruction of Frankfurst Avenue was noted positively by terminal operators.

The following observed conditions may warrant further investigation:

- Pavement conditions for Chesapeake Avenue between the Patapsco River and Shell Road. Reconstruction of a portion of Chesapeake Avenue is already planned (see project #5 on Figure 5).

- Pavement conditions for Vera Street between Chesapeake and Frankfurst Avenue.

- Pavement conditions for Shell Road (especially around the grade level railroad crossing just to the north of Patapsco Avenue), Patapsco Avenue east of Shell Road, and Fairfield Avenue between Patapsco Avenue and Chesapeake Avenue.

Curtis Bay

Truck travel routes in the Curtis Bay area include Curtis Avenue, Patapsco Avenue, Pennington Avenue and Governor Ritchie Highway. These roads connect the terminals to MD 695 and I-895.

The following observed conditions may warrant further investigation:

- Potential need for a traffic signal on Pennington Avenue at the Amerada Hess terminal, where the operator reports difficulties for exiting trucks.

Hawkins Point

From its southern intersection with Hawkins Point Road, Quarantine Road connects to MD 695 eastbound ramps, MD 695 westbound ramps (signalized intersection) and serves the City landfill and U.S. Gypsum Dock. Truck volumes along Quarantine Road, Hawkins Point Road and Pennington Avenue vary between 100 to 200 trucks per hour, with daily truck percentages averaging between 20% – 25%.

The signalized intersections of Quarantine Road with Hawkins Point Road and the MD 695 westbound ramp each experience peak hour congestion. Northbound traffic on Quarantine Road is often queued at the westbound MD 695 ramp. There is an extra delay for the trucks making this turn due to the uphill grade on Quarantine Road at this point. The Quarantine Road/MD 695 intersection is already planned for improvement (see project #1 on Figure 6).

The following observed conditions may warrant further investigation:

- Intersection capacity at Quarantine Road and Hawkins Point Road, as previously discussed.

- Pavement conditions on Quarantine Road north of Hawkins Point Road.

- The intersection of Hawkins Point Road/Chemical Road is signalized and trucks turning out of Chemical Road have adequate turning radii. The northbound approach to this intersection is a curb cut for the Yellow Freight Systems office. Trucks exiting this facility, particularly those turning right, must cross into the

opposing travel lanes on Hawkins Point Road because there is an insufficient turning radius.

Sparrows Point

Major local truck travel routes are MD 157, MD 158, Sparrows Point Boulevard, Tin Mill Road and Wharf Road. Regional highway access is provided via MD 695 at Exits 42 and 43. Vehicle classification counts on MD 158 and MD 151 show that peak hour volumes are relatively low (between 100 and 400 vehicles per hour) and peak hour truck volumes vary between 10 and 40 trucks. The terminals in this area are somewhat remote from other activity centers. No observed conditions appear to warrant further investigation.

Highlandtown

This area is inland from the primary Port terminals and is characterized by mixed-used dense urban development. The Norfolk Southern Intermodal Yard is located in this area. Regional highway access in this area is provided by I-895, I-95 and U.S. Route 40 (Pulaski Highway). A container storage yard is located on Lombard Street, between I-895 and Kane Street. Some container movement along residential streets has been observed around Lombard Street in this area. No observed conditions appear to warrant further investigation.

7.2.3 National Highway System (NHS) Connectors

In 2001, the Baltimore Metropolitan Council led an interagency freight workshop to identify National Highway System connector issues and needs and develop recommendations. These needs reflected a combination of infrastructure, operations, and land use issues, and were not limited to Port of Baltimore (or necessarily generated by) Port of Baltimore activities. Some of these are similar to observations made by the Consultant team, and some are already being addressed by ongoing or planned improvements; others remain issues for further investigation.

Issues Being Addressed by Ongoing or Planned Improvements

- Pavement condition on Chesapeake Avenue and Curtis Avenue
- Operations on Clinton and Newkirk streets

Issues Identified by Consultant Team

- Geometric design of the Keith Avenue/I-95 access ramp and congestion on Keith Avenue
- Pavement conditions on Broening Highway
- Pavement condition on Fairfield Road and Patapsco Avenue east of Shell Road

Other Issues for Further Investigation

- Pavement condition on Vera Street
- Operations on New Vail Street
- Parked vehicle obstructions, excessive travel speed, and snow removal on Broening Highway
- Interstate access for Norfolk Southern Bayview Yard
- Winter maintenance of Frankfurst Avenue near the Harbor Tunnel Thruway (I-895)
- Safety and enforcement (trucks in the left lane), I-895 at Frankfurst Avenue
- Congestion and traffic flow issues between I-895 and MD 43
- Spot maintenance of I-95 between the Fort McHenry tunnel and I-695
- Need for widening to six lanes, I-70 west of US 29
- Need for truck climbing lanes, I-83 north of Hunt Valley
- Potential need for/utility of dedicated truck lane in the Fort McHenry Tunnel

7.3 Rail-Related Needs

7.3.1 Access and Service Needs Identified by Shippers and Operators

During the interview portion of this study, shippers and terminal operators were contacted regarding rail access and utilization. The interviews confirmed that:

- Weight and distance are the primary factors governing landside modal use decisions; and
- Rail is generally less competitive than truck for most landside movements and that rail offers an overall lower level of service. [11]

Shippers and terminals that currently utilize rail report a good level of service and access, with some room for improvement. Interviewees that do not currently use rail for landside distribution say that rail does not provide competitive service to their customers. One of the principal reasons for the lack of rail competitiveness is the regional nature of the Port of Baltimore "freightshed." As mentioned earlier in this report, shipping costs by truck are more competitive for short haul trips and for shipment of high-value, low weight, and time-sensitive commodities. Rail is more competitive for long haul trips and for heavy, low value commodities. Interviewees said that more frequent switching would improve the competitiveness of rail. Currently, the freight railroads offer switching services once (or less) each day, which prohibits some businesses from loading and unloading railcars as often as they would prefer.

Some shippers and terminals said that they would use rail more intensively in the future if either a) business opportunities where rail is competitive present themselves, or b) investments are made in the rail system to improve its reliability and competitiveness. The following paragraphs summarize the interview responses with regard to rail level of service:

- Rail continues to be highly effective for moving bulk commodities such as coal. CSXT, at its Coal and Ore Terminal, is currently investing $1 million in an ongoing two-year project to improve track alignment to increase throughput and reduce dwell times of their rail cars. This project should enhance the operational efficiency of the rail-to-ship transload operation. The Pier currently receives 4 million annual tons of coal, up from previous annual levels of 2.5 to 3 million. Growth in rail coal shipments is expected to continue, with export growth fueled by China's increasing coal demand. The facility is one of two coal marine terminals in Maryland.

[11] These viewpoints are generally true for rail freight throughout the U.S. Rail is typically more competitive at longer distances (400+ miles) and for heavy and relatively inexpensive commodities i.e., coal and bulk materials.

- One liquid bulk distributor that generates between 8 and 16 railcars daily said its primary service problem is the lack of frequently switching service by CSXT. The company depends on CSXT for switching services and complains that the service is not frequent enough for their needs. The company also indicated that it's rail service would increase dramatically (150 outbound railcars daily) if it receives additional waterborne shipments.

- One forest product terminal that utilizes both CSXT and NS reported that it frequently is faced with car supply and delay issues from both railroads.

- One company that utilizes rail for approximately 10% of its shipments said that transportation costs drive its logistics decisions. Because a truck shipment is currently less expensive than rail, the company relies more heavily on truck.

- Generally, some shippers and terminals said they would use rail if the U.S. rail system were competitive and if it had better service and equipment, or if double-stack container access to Baltimore could be improved. Some terminals already have rail sidings that may be used in the future if customers request rail or if other business opportunities merit rail service.

Many terminal operators and shippers interviewed for this study report that rail was once used to move various commodities from their respective sites. Some terminal operators said that rail spurs to their site are either in disrepair or abandoned. Most now report that they use truck exclusively for landside shipment and, due to the lack of competitiveness of freight rail, do not plan to shift to rail in the future. Some examples include:

- A cement distributor said its rail spur has been removed and therefore utilizes truck exclusively.

- An asphalt distributor has a rail spur but does not utilize it.

- An importer of agricultural equipment has rail access from Dundalk but utilizes truck exclusively to deliver to its regional markets.

- A construction equipment importer operating at Dundalk uses truck exclusively.

- One auto importer distributes exclusively by truck from the Dundalk and Chesapeake Terminals, even though rail access exists to both terminals. Another operating at Dundalk also uses truck exclusively and said that rail is difficult to sell because of the intermodal transfer.

- A coal terminal used to ship by rail to the Brandon Shores (Constellation Energy) Power Plant in Anne Arundel County, but the rail lines have been abandoned and the coal is now shipped by barge across Baltimore Harbor to the plant.

Most shippers and terminal operators said they will continue to use the same modal split in the future, unless the cost of rail decreases or new business opportunities present

themselves that require increased utilization of rail freight. Key challenges to this modal split include high costs of rail compared to truck and infrequent switching services.

7.3.2 Access and Service Needs Identified by the MPA

The Maryland Port Administration's *Strategic Plan 2002* identified a series of recommendations and challenges, including the following rail access challenges:

- Rail clearances to accommodate high-cube containers in a double-stack configuration. Currently, vertical heights are restricted by antiquated rail tunnels through Baltimore City (for CSX); heights are sufficient for double-stacked standard height containers (and standard height tri-level auto-carrying railcars), but not for double-stacked "high cube" containers or next-generation tri-level auto carriers. Vertical clearances on Amtrak's Northeast Corridor (over which NS operates) are also restricted. This is one of the major elements of the MAROps program.

- Dual rail access to all marine terminals. This would allow CSX and NS to compete for business, ideally resulting in the availability of better rail service and/or lower rail rates. Currently, some terminals have dual access (via trackage agreements) but many do not.

- System-wide preservation and enhancement of an old rail network to ensure efficient and effective service to the Port. Much of the rail network serving the Port dates from the mid-1800s, and has been adapted over the years as part of different systems.

These represent both near-term and long-term needs, in that the need for solutions is in the near term, but the implementation timeframe is likely to be quite long.

8.0 Long Range Needs

8.1 Overview

This section of the report addresses the following questions:

- What long range needs (generally between five and 20 years) can be identified?
- Which are being met or will be met by established transportation plans?
- What additional issues should be evaluated for potential action?

Truck and rail access are addressed separately.

8.2 Truck-Related Needs

8.2.1 Local Access

For each of the intersections previously evaluated for current level of service, future levels of service (2025) forecasts of performance were developed. Growth factors for Port of Baltimore trucks were estimated by applying the annual growth factors for marine cargo, as provided by the MPA; MPA's forecast was through 2020, but we extended it to cover 2025. This approach assumes that the current mode splits between truck and rail remain the same, and that truck demand grows in direct proportion to the amount of cargo handled. At the lower forecast rate (3%), Port of Baltimore truck trip generation is projected to double by year 2025.

These growth factors – along with the origin-destination findings from our surveys -- were selectively applied to origin-destination tables in the BRTB's regional travel demand model, in place of default values. Growth factors for background traffic were left as defined by the BRTB model. The model was used to develop forecast volume estimates by segment. Finally, these estimates were used to perform intersection level of service analyses using the Critical Lane Volume (CLV) analysis method, as previously discussed in Section 6.1. The analysis was conducted for the morning peak hour of travel.

Detailed results are presented in Appendix I, and are summarized in Table 14 on the following page. The key finding is that three intersections are projected to operate over capacity -- Quarantine Road at MD 695, Quarantine Road at Hawkins Point Road, and

Boston at Ponca. Quarantine Road at MD 695 is planned for near-term improvements that should result in acceptable performance, but the other two intersections are not.

Table 14. Intersections Over Capacity in Year 2025, CLV Methodology

Geographic Area	Intersection	Planned for Improvement?
Canton	Boston at Ponca	Not currently
Hawkins Point	Quarantine Rd at Hawkins Point Rd	Not currently
	Quarantine Rd at MD 695 WB Ramp	Yes, interchange project

8.2.2 Regional Access

Relationship of Port of Baltimore Traffic to Regional Traffic

We have estimated that Port of Baltimore terminals generate approximately 12,000 trucks per day, and that this figure is likely to double to 24,000 trucks per day by the year 2025. With two exceptions, local intersections serving Port of Baltimore terminals should generally be well-positioned in terms of capacity to accommodate this increase. What about the regional access system?

This question is complicated by the fact that even with substantial growth, Port of Baltimore trucks represent only a limited share of regional truck traffic. The BRTB regional travel demand model forecasts over 485,000 daily heavy truck trips from all sources, so Port of Baltimore trucks would comprise an estimated 5% of the total regional truck trips in year 2025. What happens to the other 95% of trucks, and what happens to background auto traffic (which significantly outnumbers truck traffic), will be far more critical determinants of future conditions on the regional access system than growth at the Port of Baltimore.

Findings from the Constrained Long Range Plan

The BRTB's Constrained Long-Range Plan (CLRP) contains a set of proposed transportation infrastructure improvements that member jurisdictions have committed to fund over a 20-30 year timeframe. This transportation system is the basis for air quality conformity testing and other long-range planning activities. According to the forecasts, regional demand for highway capacity is forecast to grow at slightly more than 1 percent annually (as measured in vehicle miles of travel). More significantly, the amount of travel spent in congested conditions each day by the year 2030 is forecast to more than double over year 2000 conditions.

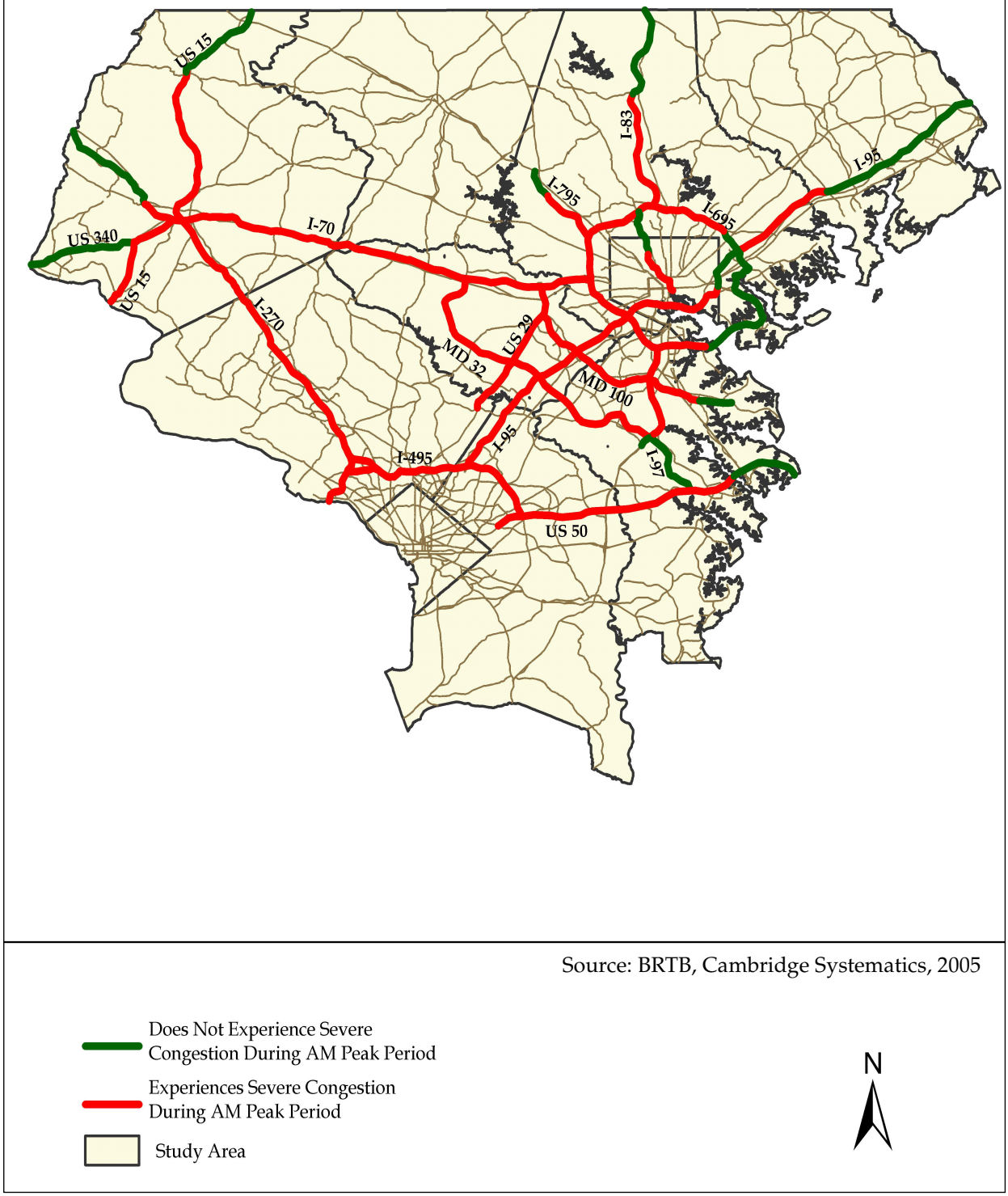
According to these forecasts, the distribution of the demand and congestion appears to be concentrated on the regional interstate system. By the year 2030, the region's interstate system will carry more than half of all daily travel (measured by vehicle miles traveled, or VMT). Roughly one-half of morning peak VMT on the interstates will occur in conditions of congestion, and roughly one-quarter or all VMT on the interstates will occur in conditions of congestion. Peak hours will tend to "smear" out throughout the day, making it increasingly difficult for trucks to avoid congestion during daylight hours.

Figure 15 on the following page below depicts critical highway segments that are forecast to experience at least one hour of congestion per day, even after the Constrained Long-Range Plan's preferred improvements program are implemented. Congestion in this case is defined as highway Level of Service E or F, based on a standard performance scale where A is free flow and F is highly congested stop-and-go traffic. Virtually all of the major elements of the radial system of roadways that lead to and from the City of Baltimore are shown to be congested at least some of the day. In particular, major segments of almost all the major truck access routes cited by truckers in the Port origin-destination survey, including I-695, I-95, especially the sections near I-895 and from I-695 to MD 152 and I-83, show congested conditions in the morning peak period. There are no alternative roadways for traffic bound for the I-95 corridor or for traffic with an origin/destination in or near the City of Baltimore.

The BRTB's Preferred Scenario reflects additional improvements compared to the CLRP, and provides for better year 2030 system performance across a variety of important measures. However, the overall findings regarding highway system congestion are fairly similar to the CLRP scenario – much of the region's system will experience unacceptable levels of service for one hour or more per day. In order of magnitude terms, average trip times will increase by 25%, and the amount of VMT during congested periods will more than double. Interested readers are referred to BRTB's *Transportation 2030* report for further details.

Addressing long range regional highway congestion is, in our view, the most significant access challenge facing the Port of Baltimore. However, it must be noted that the Port of Baltimore is not alone in facing this problem. Other mid-Atlantic ports – New York/New Jersey, Philadelphia, Wilmington, Norfolk, etc. – will be contending with comparable (if not worse) levels of regional congestion. To the extent that the Baltimore region's issues can be addressed faster and more effectively than in other port regions, it would offer a significant competitive advantage for Maryland's Port of Baltimore.

Figure 15. Roadways Experiencing Congestion for at Least One Hour Per Day, BRTB 2030 Constrained Long-Range Plan Scenario



8.3 Rail-Related Needs

8.3.1 Rail Projects

Most of the long-range project needs that can be identified at this time are represented in the MAROps program, as discussed in Section 4.2 previously. With respect to rail, the most critical long-range challenge is to address capacity and clearance constraints associated with Baltimore's antiquated rail tunnels. This is being addressed through the MAROps study, and through parallel investigations of various Baltimore rail corridor alternatives.

8.3.2 Rail Programs

In addition, the Consultant has identified a series of other long-range programmatic needs for further consideration:

- Providing efficient interaction of passenger and freight traffic on shared-use track. The Port of Baltimore relies on two primary north-south rail lines to move freight to and from national shippers and receivers. These two lines, owned by CSXT and Amtrak (with NS trackage rights) carry 27 and 8 freight trains respectively, on an average day. Some of these "through" trains stop in Baltimore to switch carloads to and from shippers and receivers in the Port area. For other trains, the Port is either the final destination or origin and trains are disassembled or assembled in various yards and terminals. In addition to freight traffic, these two lines carry some of the highest intercity and passenger train volumes in the U.S. For example, Amtrak runs 82 intercity passenger trains north and south of Baltimore on its Northeast Corridor line (in addition to 8 NS trains). Over that same line, the Maryland Transit Administration operates 14 MARC Commuter trains north of the city and 44 south between Baltimore and Washington, D.C. On the CSXT's Camden line between Baltimore and Washington, D.C., MARC runs 20 daily commuter trains in addition to CSXT's 27. The availability of freight capacity on these lines is affected by the amount of passenger traffic they are expected to carry.

- Exploring rail freight diversion potential to mitigate highway impacts. According to the Federal Highway Administration's Freight Analysis Framework freight movement in the U.S. will double over the next twenty years. Both rail and truck volumes will increase, but the share of rail freight will decrease relative to the rapidly increasing share of truck freight (48% rail tonnage increase vs. 73% truck tonnage increase)[12]. This national prediction is consistent with forecasts by shippers and terminal operators at the Port, most of whom foresee moderate growth in rail (if

[12] Federal Highway Administration. Freight Analysis Framework

they are using rail already), but predict largest share of growth will be by truck. In light of these predictions, public policy makers and their stakeholders in the private transportation industry continue to explore the possibility of diverting a portion of truck freight to rail in an effort to ameliorate traffic congestion. Several studies, including the Mid-Atlantic Rail Operations Study (MAROps) have explored the potential for diversion and have found that long haul truck trips (500+ miles) provide the greatest potential[13].

- Addressing multi-state system-level chokepoints. With some exceptions, rail is generally most competitive for longer-distance moves over 500 miles. The existence of chokepoints anywhere along the route limits its effectiveness. Rail corridor improvements therefore must be coordinated across multiple states, multiple jurisdictions, and in many cases multiple railroad operators. Rail freight needs in five states (Maryland, Virginia, Pennsylvania, Delaware, and New Jersey) were recently evaluated through the Mid-Atlantic Rail Operations Study (MAROps). The study, jointly sponsored by the five states, three railroads (Amtrak, CSXT, and NS) and the I-95 Northeast Corridor Coalition, identified a program of $6.2 billion in strategic public-private investments to relieve identified "chokepoints" in the Mid-Atlantic region. Chokepoints are "physical points in the rail system (bridges, tunnels, track segments) that have reduced capacity and operational capabilities to the rest of the system.

- Improving rail freight accessibility and safety. This includes addressing the physical and operating constraints associated with Baltimore's aging rail tunnels, passenger-freight traffic interaction, and at-grade rail crossings at a programmatic level.

Rail forecasts have not been developed as part of this study, for the simple reason that at present, conditions are uncertain. Port of Baltimore tonnage is projected to grow at between 3% and 4% annually. Whether the rail system keeps pace with this growth and preserve its current market share, or loses market share, or possibly even gains market share, depends largely on the ability to provide needed rail system improvements and the commitment of national railroads to serving the Baltimore market.

For shorter-haul moves, trucking is preferred to rail. But rail is a viable option for longer-distance moves. To the extent that rail's current share for this traffic can be preserved, the need for additional highway investment may be partially offset or delayed, and new inland markets may be opened up for Port of Baltimore services.

[13] I-95 Corridor Coalition. Mid-Atlantic Rail Operations Study

9.0 Opportunities

The Regional Landside Access Study for Maryland's Port of Baltimore is a planning study. It was not intended to substitute for capital plans prepared by various responsible agencies, nor was it intended to dictate responsibility for particular improvements or actions or expenditures. It was intended to suggest a set of cross-modal and cross-jurisdictional issues and opportunities, so that responsible agencies can work cooperatively from a common road map of potential actions. This could be accomplished within existing organizational relationships, or by creating new kinds of cross-modal and cross-jurisdictional relationships focused on critical freight access issues.

9.1 Highway Opportunities

9.1.1 Recommendations from Existing Plans and Programs

One of the important and positive findings of this study is that many of the projects currently planned/programmed by MDOT, BRTB, and/or the City of Baltimore will support and enhance truck access to the Port of Baltimore. The most significant of these are listed in Table 15 on the following page, and are recommended for special emphasis. For detailed information on project status, phase, funding, and other details, readers are referred to the most current available information from the appropriate lead agency.

Table 15. Selected Highway Projects from Existing Plans and Programs

Source & Plan Year	Description	Comments
MDOT's CTP (2005) and BRTB Transportation 2030 Plan (2004)	I-695, I-95, I-83 improvements	These projects will add critically needed regional access capacity through additional lanes, managed lanes, interchange improvements, and other capacity and safety improvements. Port of Baltimore traffic depends heavily on these highways.
Baltimore CIP (2004)	Rehabilitate Newkirk Street from Boston Street to Keith Avenue	This will improve roadway conditions on an important industrial street in the Canton area of the Port.
Baltimore CIP (2004)	Rehabilitate Haven Street from Boston Street to its dead end.	This will improve road conditions for trucks. If South Haven Street is also connected to Holabird Avenue trucks would have an alternate route to get to Boston Street from the Clinton Street terminals. (see next improvement…)
BRTB Transportation 2030 Plan (2004)	Extend Keith Avenue from Broening Highway to Dundalk Avenue	The BRTB plan envisions creating a full interchange at Keith Avenue and Broening Highway and extending Keith Avenue from Broening Highway east to Dundalk Avenue. Access between Keith Avenue and Holabird Industrial Park is also part of this project. This project will improve truck circulation in the Port area by enabling eastbound Keith Avenue traffic to turn north on Broening Highway and southbound Broening Highway traffic to access Keith Avenue.
Baltimore CIP (2004) BRTB TIP (2004)	Replace Hawkins Point Road Bridge over CSX tracks	The replacement of this bridge is essential to keeping Hawkins Point Road open for truck traffic.
Baltimore CIP (2004) BRTB TIP (2004)	Reconstruct Chesapeake Avenue from Sun Street to its terminus	This improves a major industrial street that is in very poor condition.
Baltimore City	Construct Key Highway East to Hull Street Connector	This improvement would provide another access point for truck traffic to/from North Locust Point and provide better general access to redeveloping waterfront properties.

9.1.2 Additional Project Opportunities for Consideration

MDOT, the Project Management Team, the Project Advisory Team, and the study consultants have explored possible additional projects for further consideration as part of future capital planning and programming activities. Generally, these are aimed at improving access to the Interstate system while reducing travel on roadways that pass through other neighborhoods that have predominant land uses not conducive to trucks.

Some of these recommendations involve realignment/reuse of rail system assets, and it is recognized that any reorganization of the railroad system must take into consideration the present and future operations of the Maryland Transit Administration (including the MARC Commuter Rail service on the Camden and Penn Lines, possible future rail stations, future storage facilities, possible transit-oriented development (TOD), and the Red and Green Lines), as well as freight operations by the Canton Railroad and the privately-owned railroads serving the Port of Baltimore.

Dundalk/Seagirt and Canton

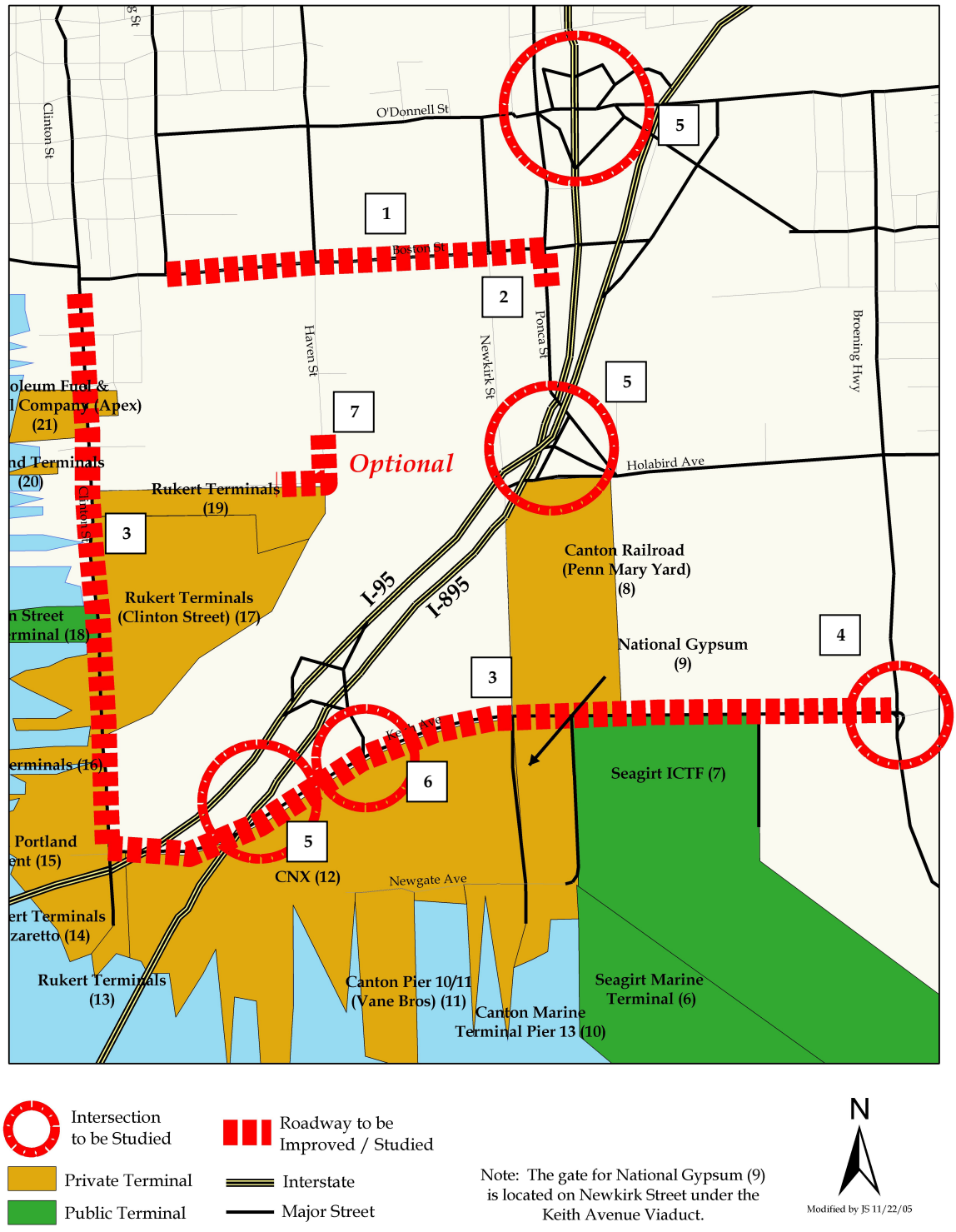
These areas are currently well served by the expressway system. I-95 provides a full set of NB and SB on/off ramps via Exit 56 to this area via Keith Avenue and via Exit 57 to the Interstate Avenue /O'Donnell Street area to the north. I-895 provides somewhat more limited access with northbound exit ramps to Holabird Avenue, O'Donnell Street, O'Donnell Street Cutoff and Lombard Street and a single southbound exit ramp to eastbound Lombard Street. Entrance ramps are limited to southbound I-895 from O'Donnell and Lombard Streets and northbound from Lombard Street.

The area is challenging. It is bracketed by a combination of east-west streets (Boston Street, Holabird Avenue and Keith Avenue), and a set of north-south streets (Clinton Street, South Highland Ave, South Haven Street, South Newkirk Street, Ponca Street and Broening Highway). The area is quickly changing character, with auto-oriented commercial uses emerging along Boston and other streets. One of the most critical challenges is maintaining truck access, and in particular, preserving "over-dimension" routes to Dundalk. The following opportunities (mapped on Figure 16 following) are suggested for consideration:

- (1) Boston Street projects. Boston Street is the major east-west street (two travel lanes in each direction west of Clinton Street) serving this area from the west. Widening Boston Street east of Clinton Street to provide a similar configuration (two lanes in each direction) has been discussed but is not programmed. East of Clinton Street, there are two significant at-grade rail grade crossing – one between Conkling and Newkirk, and one between Newkirk and Ponca. We believe it is extremely important to improve through capacity on Boston Street, and to eliminate the rail grade crossings on Boston between Clinton and the I-95 interchange.

- (2) Boston Street/Ponca Street interchange. Ponca Street is a boundary street to the Canton area and is a particularly important street for truck traffic. The northbound Ponca Street approach to the intersection could be widened to include a left-turn lane and a wider right-turn/through lane with improved turning radius to facilitate the truck traffic using Interstate Avenue to access the Interstate 95 ramps. While the full improvement of Boston Street, including the intersection with Ponca Street, is desirable, a spot intersection improvement as an early action item would be warranted at Ponca Street. This would be an improvement from Ponca to west of the railroad tracks to allow a west bound merge from two to one lane west of the tracks. The east bound improvement would be two lanes from west of the tracks to allow sufficient storage, and a left turn lane at Ponca Street, which is also used to access the gas station on the NW corner.

Figure 16. Additional Highway Opportunities, Dundalk/Seagirt/Canton



- (3) Clinton Street/Keith Avenue truck corridor. Truck traffic on Boston Street continues to compete with auto traffic. This highlights the importance of an alternative truck route between Canton's terminals and the interstate highway system. The logical truck route is Clinton Street south of Boston Street to Keith Avenue, extending as far east as Broening Highway. It is also important that Clinton Street be preserved as the "high/wide" route to Port facilities. Preservation and enhancement of this corridor is critical to providing continued access to I-95 via the Keith Avenue interchange. Following completion of construction on Clinton Street, the potential need for future improvements (signage, etc.) should be evaluated.

- (4) Keith Avenue/Broening Highway intersection enhancements. The current BRTB 2030 Transportation Plan calls for a full directional interchange and extension of Keith Avenue to Dundalk Avenue. Future redevelopment that may occur on the General Motors site could affect the design and functional requirements for this interchange, and will require further study.

- (5) I-895 interchange evaluations. Truck access to I-95 is good (via Keith Avenue and Boston Street), but is indirect for I-895, which parallels I-95. There have been requests in the past to investigate the addition of movements from SB I-895 to Lombard and Ponca streets. Changes to these interchanges would need to be considered as part of the entire I-95/I-895 corridor. The I-895 mainline is physically constrained by the height and width of the Harbor Tunnel and environmentally sensitive areas southwest of the tunnel. Although no immediate concerns were identified in this study's truck survey or traffic projections, the Maryland Transportation Authority should continue to monitor truck access issues as the Port develops over the next 20 years. Future redevelopment of the GM property may also provide the opportunity or need to upgrade the current I-895/Holabird Avenue interchange.

- (6) I-95/Keith Avenue interchange evaluation. Review of the geometric design and operation of this interchange was identified by the Consultant and recommended by the BMC's study of National Highway System connectors.

- (7) Optional Holabird Avenue/Haven Street connector. The need for this project depends largely on the configuration of the Boston Street viaduct and the future land uses in the area around Haven and Boston Streets. If the intersection between Boston and Haven Streets is eliminated and/or the land uses along Haven Street remain industrial, then it is desirable to connect Haven Street to Holabird Avenue to provide access to the Clinton Street/Keith Avenue truck corridor as an alternative to Boston Street. However, if the intersection is maintained or the land use along Haven and Boston Streets becomes auto-oriented commercial or residential, then not completing the connection might be more desirable, since it would provide a barrier between truck traffic from Holabird Avenue and any future residential/commercial land uses.

- (Not shown on Figure 16) Signal timing evaluation for Keith Avenue/New Vail Street and Broening Highway/Point Breeze/Seagirt Marine Terminal, and pavement condition review for Broening Highway and Newgate Avenue.

Fairfield, Curtis Bay, and Hawkins Point

The Fairfield area is served by I-895 with a northbound exit ramp at Childs Street, southbound exit ramps at Frankfurst Avenue and at Shell Road, a northbound entrance ramp at Frankfurst Avenue and a southbound entrance ramp at Childs Street. The recent completion of the intersection complex of Patapsco, Curtis and Pennington Avenues includes the viaduct under the CSX rail corridor and improves the performance of the arterial system in Fairfield.

The Curtis Bay area is the only major terminal area not served directly by an interstate ramp system. Pennington and Curtis Avenues (a one-way couplet) provide access to I-895 north of the terminals (at Fairfield), and to I-695 south of the terminals (near Hawkins Point). This corridor has existing major housing and commercial development along it and to the west and is not well-suited for truck access.

Hawkins Point is well served by I-695/MD 695, with ramp systems to both the east and the west. The congestion at the intersection of Hawkins Point Road and Quarantine Road, which has an existing diamond interchange with MD 695, will be alleviated by the programmed reconstruction of the interchange.

The following opportunities (mapped on Figure 17 following) are suggested for consideration:

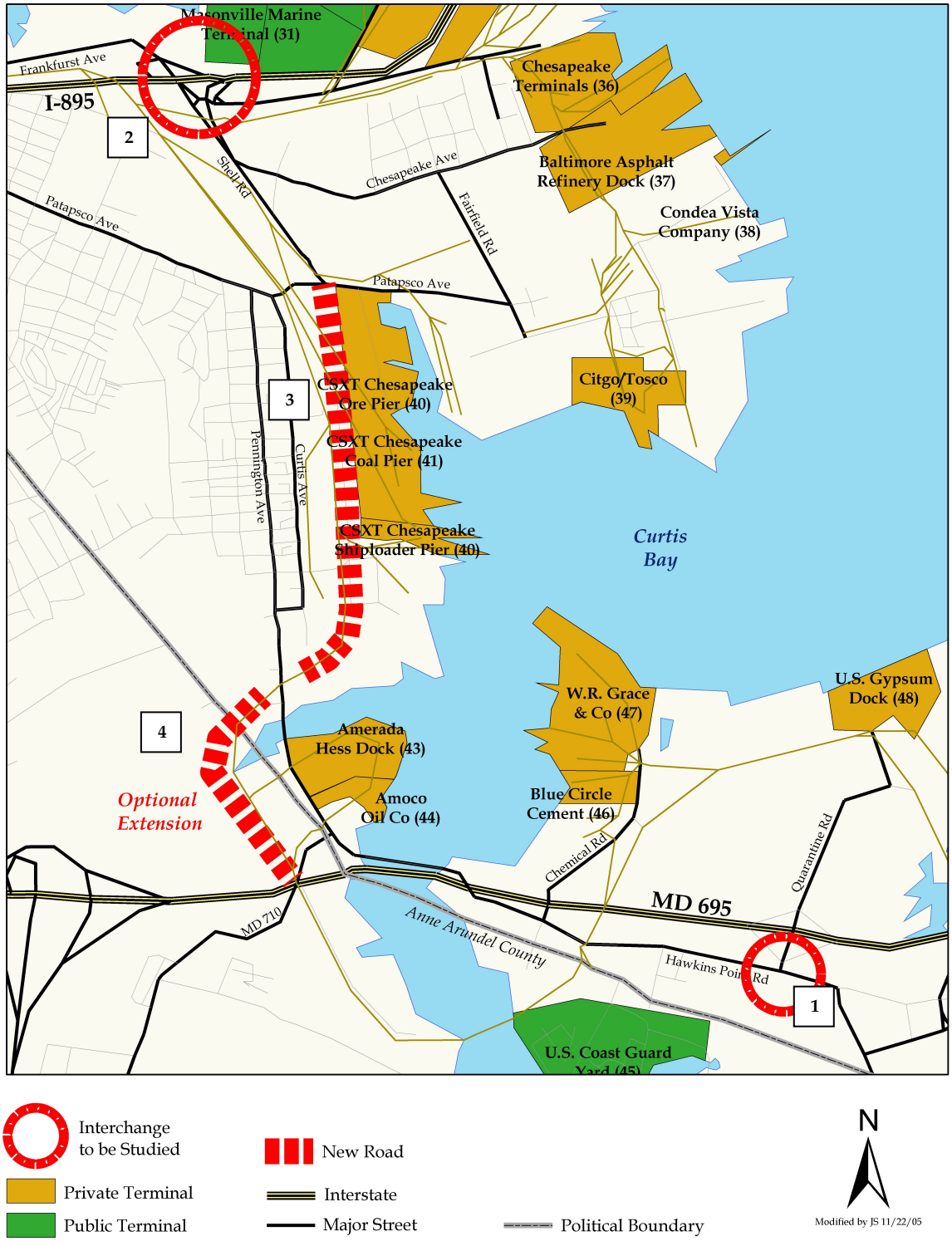
- (1) Intersection evaluation at Quarantine Road/Hawkins Point Road

- (2) I-895/Shell Road connector. Study the feasibility of a ramp from EB I-895 directly to Shell Road to facilitate truck flows to the Fairfield and Curtis Bay terminals.

- (3) Shell Road extension from Patapsco Avenue to Pennington Avenue. There is an existing rail corridor running in the north-south direction, east of Curtis Avenue and within the Curtis Bay terminals area. If further investigations determine there is sufficient right of way – we would emphasize that this has not been established – then Shell Road might be extended further south from its current terminus at Patapsco Avenue, running through the Curtis Bay terminals area, and connecting with Pennington Avenue. This would provide a truck bypass to Pennington/Curtis Avenues. It might also serve as a bypass route for auto traffic.

- (4) Optional Shell Road extension from Pennington Avenue to Ordnance Road. The rail corridor also continues further south, and crosses Ordnance Road near its intersection with Stahl Road. It has been suggested that the Shell Road Extension could be continued from Pennington Avenue through to the intersection of Ordnance Road with Stahl Road. This would provide a separate truck facility between the Shell Road/Patapsco Avenue intersection in Fairfield and the Ordinance Road/Stahl Road intersection just west of Hawkins Point. However, the Pennington Avenue appears to have good capacity and few land use conflicts along this reach, so this further extension might not be needed, at least in the near term.

Figure 17. Additional Highway Opportunities, Fairfield/Curtis Bay/ Hawkins Point



- (Not shown on Figure 17) Pavement condition evaluations for Vera Street, Chesapeake Avenue, Shell Road, Patapsco Avenue, Fairfield Avenue, and Quarantine Road, and traffic signal evaluation for the Amerada Hess entrance off Pennington.

Interstate Access to Maryland's Port of Baltimore

In addition to programmed and planned interstate highway improvements, other concepts recommended by study participants include:

- I-70 enhancements. For segments of I-70 where the typical sections lose a lane between US 29 and US 40, consider adding a lane in each direction
- I-83 enhancements. For segments of I-83 at various locations north of Warren Road, consider adding truck climbing lanes to address steep rolling hills

A more detailed statewide analysis of truck-serving infrastructure and operations needs, addressing both Port and non-Port traffic, is being performed as part of the ongoing *Maryland Freight Strategy*, which will address these and other recommendations relating to interstate access in greater depth.

9.1.3 Policy Opportunities for Consideration

The issues of local access and interstate connectivity can be and are being addressed by improvement projects. But even with substantial planned investments in the region's transportation system. segments of congestion are forecast. Port of Baltimore trucks make a relatively small contribution to regional congestion, and solutions must address the entire population of trucks, as well as autos, that use the system.

- Value pricing. There is a growing national interest among policy makers in managing travel demand rather than accommodating it, using variably-priced tolling schemes. With variable toll pricing, travelers pay a higher toll to travel on high-demand facilities during peak hours of demand than at other times of the day. This encourages travelers to initiate their travel during off-peak times, when possible. The concept is very similar to the way telephone or cellular phone uses are billed, charging more during peak use times and less during non-peak times like evenings and weekends. Likewise, as regional planners and policy-makers look towards new approaches for managing congestion, they will need to consider opportunities to price peak highway travel to better accommodate travel demands. The use of "value pricing" (or congestion pricing, differential pricing, variable tolling, peak-period surcharging, etc.) to encourage trucks to travel in the off-peak is being implemented throughout the US. Many toll roads offer after-hours discounts. In Los Angeles and Long Beach, one-third of port trucks move after 6 PM, in part due to a differential pricing program known as "PierPass," which was actually put in place by the shippers themselves. Variable pricing can also discourage discretionary auto trips during peak periods, providing additional capacity for trucks and autos that must travel in the peaks.

- Toll policy. Related to value pricing, toll policy is the responsibility of the Maryland Transportation Authority.

- Managed lanes. There are several varieties of managed lanes – truck-only lanes, general purpose toll lanes, etc. – that can be considered. Virginia is considering one private sector proposal to build truck-only lanes on I-81 and another to build general purpose and high occupancy toll (HOT) lanes on the Washington Beltway. Maryland is also considering managed lane concepts, as discussed previously in Section 4, for I-95 near Baltimore and also for the Washington Beltway (I-495), as well as on I-270, I-695, US 50, MD 5 and US 301. Given that congestion on the interstates serving the Port of Baltimore is due primarily to non-commercial vehicles, the best approach may be general purpose toll lanes. Trucks could use the free lanes while still benefiting from reduced congestion, because of autos shifting out of the free lanes. There are, of course, major issues to be resolved with this approach – pricing, public versus private participation, etc. However, it can be an excellent strategy to overcome the basic problem of limited funding for needed highway improvements.

- Intermodal partnership. The trucking industry is one of the railroad industry's biggest customers. It contracts for the long-haul movement of trailers on flatcars, containers on flatcars, and truck bodies on rail cars, in either single-stack or double-stack configurations. Preserving and enhancing the ability of the rail industry to meet the needs of the trucking industry is vital, unless we want to see this traffic shifted onto the highway system. There may be opportunities for rail to provide better service to the intermodal community, in the form of shorter-haul services; many ports are considering short-haul "shuttle train" or "sprint train" services to reach critical market clusters and/or inland ports.

- Short sea shipping. The use of short sea shipping (primarily container on barge) is being promoted by the US Maritime Administration and many ports as offering an alternative to trucking over longer distances. The Port of Baltimore already relies heavily on domestic shipping, which reduces its need for highway and rail service. Expanded short sea shipping may be a useful strategy for expanding Port of Baltimore markets along the eastern seaboard. However, does not project to be a good strategy to mitigate existing truck traffic, since most of the Port's truck traffic is either local or to inland locations in nearby states that must be served by truck.

- Multi-state highway system assessment. Truck moves cross local, regional, and state boundaries, and chokepoints on any part of the trip affect the overall service. There is no national strategy or basis for freight planning that addresses trucking needs at the system level. Some sort of expanded assessment of infrastructure condition and needs beyond the Maryland borders, extending into Pennsylvania and possibly other key trading partner states, may be warranted. The ongoing *Maryland Freight Strategy* effort should provide the opportunity to address this issue in greater detail than was possible in this study.

9.2 Rail Opportunities

9.2.1 Private Sector Role

Most of the region's rail freight infrastructure is privately owned, and the responsibility for improvements rests with the private sector. Potential improvements identified in this study that could be implemented by the private sector focus on service. Some of the shippers and terminals interviewed for this study said they would use rail more intensively in the future if either a) business opportunities where rail is competitive present themselves, or b) investments are made in the rail system to improve its reliability and competitiveness. Shippers interviewed for this study specifically noted the following:

- Need to increase the frequency of switching service
- Need to increase the quality of equipment
- Need to improve supply of railcars and reduce delays
- Need to utilize unused sidings
- Need to make rail costs more competitive with trucking

9.2.2 Public Sector Role

Key initiatives for consideration include:

- Implementation of the MAROps program and findings from other studies of Baltimore rail corridor alternative studies which may modify selected MAROps recommendations.
- Rail preservation. Maintenance and repair of Maryland's aging rail infrastructure is a shared priority of the public and private sectors. A statewide strategy for identifying and funding the most critical improvements should be advanced, and dedicated funding at the necessary levels secured.
- Coordination of planning, improvements, and operations for freight and passenger railroads. This is an ongoing responsibility of the Maryland Department of Transportation and its modal administrations.

9.3 Summary of Opportunities

Table 16 below presents an overall summary of the opportunities identified in the *Regional Landside Access Study for Maryland's Port of Baltimore*.

Table 16. Summary of Opportunities

Recommendations	Study Goals				
	System Preservation	Connectors and Corridors	Customer Choice	System Performance	Good Neighbor Practices
Selected Highway Projects from Existing Plans and Programs					
Regional Interstate System – I-695, I-95, I-83 projects		X	X	X	
Rehabilitate Newkirk Street	X				
Rehabilitate Haven Street	X				
Keith Avenue Extension	X	X		X	
Replace Hawkins Point Road Bridge over CSX tracks	X	X			
Reconstruct Chesapeake Ave.	X				
New Key Hwy E/Hull Street Connector Loop Road		X		X	
Additional Highway Project Recommendations for Further Study					
Boston Street Projects	X	X		X	X
Boston/Ponca Improvements		X		X	
Clinton/Keith Truck Corridor		X			
Keith/Broening Intersection		X		X	
I-895 Interchanges		X	X	X	
I-95/Keith Interchange		X		X	
Holabird/Haven Connector		X	X		X
Quarantine Rd/Hawkins Point Intersection		X		X	
I-895/Shell Road Connector		X	X	X	X
Shell Road Extension(s)		X	X	X	X
I-70 Improvements		X	X	X	
I-83 Improvements		X	X	X	
Pavement evaluations (Broening, Newgate, Vera, Chesapeake, Shell, Patapsco, Fairfield, Quarantine)	X				
Signal evaluations (Keith, Broening, Pennington)				X	
Highway Policy Recommendations for Further Study					
Value Pricing			X	X	
Toll Policy			X	X	
Managed Lanes		X	X	X	
Intermodal Partnership			X	X	X
Short Sea Shipping			X	X	X
Multi-State Assessment		X		X	

Table 16. Summary of Opportunities (continued)

Recommendations	Study Goals				
	System Preservation	Connectors and Corridors	Customer Choice	System Performance	Good Neighbor Practices
Recommendations for Private Sector Rail Improvements					
Rail service improvements		X	X	X	
Recommendations for Public Sector Rail Improvements					
MAROps Program/Baltimore Corridor Alternatives	X	X	X	X	X
Rail preservation funding	X		X	X	
Coordination of freight and passenger planning, improvements, operations		X	X	X	X

The City of Baltimore, adjoining municipalities and the State all share in interest in supporting the Port of Baltimore by continuing to provide investments that maintain and enhance the Port's clear and substantial economic return. At the same time, multiple demands and limited budgets impose the necessity of giving priority to those planned or potential transportation investments that benefit the Port of Baltimore most cost-effectively. Those that accord with the City's, Counties' and State's broader objectives, be they related to economic development, safety, neighborhood revitalization or congestion mitigation are especially worthwhile.

Further planning will be needed to determine the specific effect and benefit of these recommendations, individually and in combination. A separate effort – the *Maryland Freight Strategy* – is being conducted by MDOT to look at freight issues at a larger level, and addresses non-Port as well as Port-related landside access needs and recommendations. In the meantime, key stakeholders with an interest in landside access for Maryland's Port of Baltimore should continue to work together to study, prioritize and implement needed improvements within the context of Maryland's overall transportation system needs.

Appendix A

Port of Baltimore Performance Data

Table A1. Port of Baltimore Commodities, 2003 (thousands of short tons)

	Total	Foreign		Canadian		Domestic
		Inbound	Outbound	Inbound	Outbound	
Total, all commodities	**40,184**	**15,381**	**4,314**	**3,604**	**797**	**16,088**
Share, all commodities	**100%**	**38%**	**11%**	**9%**	**2%**	**40%**
Coal	10,824	1,559	2,547	-	797	5,921
Crude petroleum	-	-	-	-	-	-
Petroleum products	7,291	1,913	48	214	-	5,116
Fertilizers	271	268	3	-	-	-
Other chemicals	1,123	395	104	38	-	586
Forest products, wood and chips	580	338	240	1	-	1
Pulp and wastepaper	565	392	173	-	-	-
Soil, sand, gravel, rock, stone	2,715	304	16	1,251	-	1,144
Iron ore and scrap	4,496	2,482	22	1,976	-	16
Non-ferrous ores and scrap	898	743	74	81	-	-
Sulphur, clay and salt	151	85	4	-	-	62
Slag	91	46	-	-	-	45
Other nonmetallic minerals	1,342	1,279	2	43	-	18
Paper products	870	838	32	-	-	-
Lime, cement and glass	1,175	219	54	-	-	902
Primary iron and steel products	792	521	268	-	-	3
Primary non-ferrous metal products	806	707	98	-	-	1
Primary wood products	208	201	7	-	-	-
Fish	20	20	-	-	-	-
Grain	23	19	1	-	-	3
Oilseeds	13	12	1	-	-	-
Vegetable products	56	54	2	-	-	-
Processed grain and animal feed	16	6	10	-	-	-
Fruit juices	96	95	1	-	-	-
Sugar	909	439	-	-	-	470
Molasses	120	120	-	-	-	-
Coffee	30	30	-	-	-	-
Alcoholic beverages	208	205	3	-	-	-
Other agricultural products	601	137	32	-	-	432
Machinery (not electrical)	742	531	207	-	-	4
Electrical machinery	65	42	23	-	-	-
Vehicles and parts	845	615	230	-	-	-
Other manufactured products	1,734	300	69	-	-	1,365
Unknown or other	509	466	43	-	-	-

Source: U.S. Army Corps of Engineers (ACOE), Waterborne Commerce of the United States; ; categories are as reported by ACOE.

Table A2. Port of Baltimore Commodities and Trading Partners, 2003 (millions of tons)

Type	Commodity Class	Tons (M)	Countries
Bulk Exports	Coal	3.0	Canada, Europe, Japan
Bulk Imports	Iron Ore	3.7	Canada, Brazil
	Coke	1.6	China, Japan
	Gypsum	1.3	Canada
	Liquid Natural Gas	2.2	Trinidad and Tobago
	Salt	1.2	Chile, Mexico, Caribbean
	Sugar	0.4	Brazil, Latin America, domestic US
	Molasses	0.1	Pakistan, Latin America
	Steel	0.1	Venezuela, South Africa, United Kingdom
	Aluminum Oxide	~ 0.3	South America
	Cement	~ 0.3	Netherlands
Other	Containers	4.7	Europe, Asia
	Autos	1.1	Europe, Asia, Middle East
	Forest Products	1.4	Brazil, Northern Europe
	Roll-on/Roll-off	0.4	Europe, Australia

Source: Maryland Port Administration

Table A3. U.S. Port Rankings by Tonnage and Value, Year 2003

Tonnage (short tons)			Value ($ millions)		
Rank	**Port/State**	**Tons**	**Rank**	**Port/State**	**Value**
1	South Louisiana, LA	198,825,125	1	Los Angeles, CA	$122,051
2	Houston, TX	190,923,145	2	New York/New Jersey	$101,176
3	New York, NY and NJ	145,889,166	3	Long Beach, CA	$95,863
4	Beaumont, TX	87,540,979	4	Houston, TX	$49,893
5	New Orleans, LA	83,846,626	5	Charleston, SC	$39,375
6	Huntington WV-OH-KY	77,641,149	6	Hampton Roads, VA	$32,935
7	Corpus Christi, TX	77,224,732	7	Tacoma, WA	$26,332
8	Long Beach, CA	69,195,350	**8**	**Baltimore, MD**	**$25,956**
9	Texas City, TX	61,337,525	9	Oakland, CA	$25,144
10	Baton Rouge, LA	61,264,412	10	Seattle, WA	$23,078
11	Plaquemines, LA, Port of	55,916,880	11	Savannah, GA	$21,349
12	Lake Charles, LA	53,363,966	12	New Orleans, LA	$19,411
13	Los Angeles, CA	51,327,289	13	Miami, FL	$16,610
14	Mobile, AL	50,214,435	14	Portland, OR	$11,810
15	Valdez, AK	49,856,714	15	Bridgeport, CT	$11,649
16	Tampa, FL	48,251,710	16	Jacksonville, FL	$11,235
17	Pittsburgh, PA	41,675,421	17	Port Everglades, FL	$10,499
18	Hampton Roads, VA	41,452,718	18	Philadelphia, PA	$10,315
19	**Baltimore, MD**	**40,183,371**	19	Newport, RI	$10,314
20	Duluth-Superior	38,343,379	20	Morgan City, LA	$10,108
21	Philadelphia, PA	33,248,697	21	Corpus Christi, TX	$9,859
22	St. Louis, MO and IL	32,431,145	22	Beaumont, TX	$9,616
23	Pascagoula, MS	31,291,735	23	South Louisiana	$8,761
24	Freeport, TX	30,536,657	24	Kahului, HI	$7,329
25	Portland, ME	29,160,899	25	Texas City, TX	$6,534
26	Paulsboro, NJ	27,283,400	26	Boston, MA	$5,681
27	Port Arthur, TX	27,169,763	27	Port Arthur, TX	$5,553
28	Portland, OR	26,795,881	28	Brunswick, GA	$5,432
29	Marcus Hook, PA	26,163,571	29	Hueneme, CA	$5,362
30	Charleston, SC	25,198,899	30	Wilmington, DE	$5,221

Source: AAPA (American Association of Port Authorities)

Table A4. Leading Atlantic Coast Container Ports, 2003

Rank	Port/State	TEUs
1	New York/New Jersey	4,067,812
2	Charleston, SC	1,690,847
3	San Juan , PR	1,665,765
4	Hampton Roads, VA	1,646,279
5	Savannah, GA	1,521,206
6	Montreal, QC	1,108,837
7	Miami, FL	1,041,483
8	Jacksonville, FL	692,422
9	Port Everglades, FL	569,743
10	Halifax, Nova Scotia	541,650
11	**Baltimore**	**528,899**
12	Wilmington, DE	254,191
13	Palm Beach, FL	217,558
14	Boston, MA	158,020
15	Philadelphia, PA	147,413

Source: AAPA (American Association of Port Authorities)

Appendix B

Port of Baltimore Terminals

Table B1. Terminal Commodities and Storage Capacity

ID	Name	Commodities	Storage Capacity
1	Pennwood Wharf (Mittal)	Receives construction materials. Ships: steel and steel products.[1]	N/A
2	Mittal Steel Ore Pier	Receives pelletized ore, coke, olivine.[1]	51 acres of open storage area.[6]
3	Chesapeake Bulk Stevedores	Ships and receives miscellaneous bulk materials including ore, coal, coke and slag, fuel oil and steel products.[1]	Open storage area for 200,000 tons of material, tanks for 214,000 barrels of fuel oil.[6]
4	Baltimore Marine Industries, Inc.	Facility was used to repair ships. Company declared bankruptcy in June of 2003.[2]	N/A
5	Dundalk Marine Terminal (MPA)	Receives automobiles, RoRo, containerized cargo, conventional general cargo and passenger boarding. Ships RoRo, containerized cargo, conventional general cargo.[1]	570 acres.
6	Seagirt Marine Terminal (MPA)	Receives containerized cargo.. Ships containerized cargo.	191 acres of open storage area including 125 net acres of container storage.
7	Seagirt Intermodal ICTF	Transfer facility for containerized cargo.	70 acres
8	Canton Railroad (Penn Mary Yard)	Switching facility – connects port facilities to Norfolk Southern or CSX railroads. Serves local industries.	N/A
9	National Gypsum	Receives gypsum rock.	Storage for 55,000 tons at the wharf and 1.3 acres of open storage at rear of plant.
10	Canton Marine Terminal Pier 13	Receives RoRo and conventional general cargo. Ships RoRo and conventional general cargo.	1.3 acres of open storage area.
11	Canton Pier 10/11 (Vane Bros.)	Receives bulk, break-bulk, and RoRo cargo.[3]	N/A
12	CNX	Ships coal and discharges break bulk, including Russian aluminum products.	N/A

=Publicly-owned facility

[1] http://www.iwr.usace.army.mil/ndc/ports/pdf/ps/ps10.pdf accessed 1/20/05.

[2] http://www.bizjournals.com/baltimore/stories/2003/06/09/daily41.html accessed 1/25/05.

[3] http://www.vanebros.com/canton.htm accessed 1/21/05

Table B1 (continued).

ID	Name	Commodities	Storage Capacity
13, 14, 16, 17, 19[4]	Rukert Terminals Corporation	Receives general cargo, RoRo cargo and dry bulk cargo. Ships general cargo and RoRo cargo.[10]	970,000 square feet of covered storage. 80,000 square feet of alloy storage in covered bin buildings. 50 acres of open storage.[5]
15	Lehigh Portland Cement	Receives cement.	Storage for 42,000 tons on-site.[1]
18	Clinton Street Marine Terminal (MPA)	Layberthing.	Not used for cargo through port.
20	Highland Terminal	Warehousing.	Pier out of service.
21	Petroleum Fuel and Terminal Company (Apex)	Receives petroleum products. Ships petroleum products.	On-site tanks provide storage for 1,500,000 barrels. Pipeline from on-site tanks to off-site tanks at 5101 Erdman Avenue provide an additional 790,000 barrels of storage.
22	Belt's Business Center (U.S. Customs Sta.)	Warehouse / Distribution center	250,000 square feet of covered warehouse space.
23	Norfolk Southern (Bayview Intermodal Yard)	Transfer facility for containerized cargo.	N/A
24	General Ship Repair	Facility is used to repair ships.	Not used for cargo through port.
25	Domino Sugar	Receives bulk raw sugar.	Storage for 52,500 tons.

=Publicly-owned facility

[4] Information is for combined operations.

[5] http://www.rukert.com/warehousing.html accessed 1/24/05.

Table B1 (continued).

ID	Name	Commodities	Storage Capacity
26	Locust Point Grain Elevator (ADM Countrymark)	No longer operational.	N/A
27	North Locust Point Marine Terminal (MPA)	Receives paper products, liquid latex, general cargo and molasses. Ships general cargo.	19 acres of open storage[6], 365,000 square feet of covered storage[6], tanks for 2,759,000 gallons of liquid latex[6] and for 8,011,000 gallons of molasses[6].
28	Baltimore Metals and Commodities Terminal (C. Steinweg)	Receives breakbulk cargo, aluminum ingots and other non-ferrous metals	4.5 acres of open storage space and 346,000 square feet of warehouse space.[7]
29	South Locust Point Marine Terminal (MPA)	Forest Products. (Note: The MPA Passenger Terminal is also under development at South Locust Point and should be in operation for the 2006 season.)	17 acres of open storage area; 620,000 sf covered storage.
30	Tyco Submarine Systems	Receives cable, machinery and communications equipment. Ships cable, machinery and communications equipment.	7 acres of open storage area
31	Masonville Marine Terminal (ATC, MPA)	Receives automobiles. Ships automobiles.	50 acres of open storage space.
32	Fairfield Auto Terminal (MPA)	Receives automobiles. Ships automobiles.	45 acres of open storage for 5,000 vehicles.
33	Atlantic Terminals	Receives automobiles and RoRo general cargo. Ships automobiles and RoRo general cargo.	53 acres of open storage area for 6,000 vehicles.
34	ST Services	Receives miscellaneous bulk liquids. Ships miscellaneous bulk liquids.	Tanks for 34,482,000 gallons.[6]
35	Port Liberty	N/A	N/A
36	Chesapeake Terminals	Receives automobiles and RoRo general cargo.	30 acres of open storage area for 5,000 vehicles.[6]
37	Baltimore Asphalt Refinery Dock/ Liquid Transfer Terminals[24]	Receives liquid latex, asphalt, and petroleum products.[6]	Tanks for 1,076,000 gallons latex, 1,022,000 barrels asphalt, and 1,278.000 barrels petroleum products.[6]

= Publicly-owned facility

[6] http://www.marylandports.com/facil/nloc.htm accessed 1/24/05

[7] http://www.marylandports.com/facil/bmc.htm accessed 1/24/05

=Publicly-owned facility

Table B1 (continued).

ID	Name	Commodities	Storage Capacity
38	Condea Vista Company	Receives miscellaneous liquid chemicals including paraffin, benzene, No. 6 fuel oil and alkalates. Ships miscellaneous liquid chemicals including paraffin, benzene and alkalates.	Tanks for 60,000,000 gallons.[6]
39	Citgo / Tosco	Receives petroleum products. Ships petroleum products.[1]	Tanks for 1,405,000 barrels.[6]
40, 41, 42[8]	CSXT Chesapeake Coal and Ore Piers, CSXT Chesapeake Shiploader Pier	Receives ore, salt, fertilizer and stone. Ships coal, stone and corn.[2]	N/A
43	Amerada Hess Dock	Receives petroleum products. Ships petroleum products.[2]	Tanks for 3,700,000 barrels.[6]
44	Amoco Oil Company	Receives petroleum products. Ships petroleum products.[1]	Tanks for 500,000 barrels.[6]
45	U.S. Coast Guard Yard	Facility is used to repair Coast Guard Vessels.	Not used for cargo through port.
46	Blue Circle Cement	Receives bulk cement	Storage for 33,000 tons of cement
47	Grace, W.R. & Co., Davison Chemical Wharf	Receives 50% sodium hydroxide solution, sulfuric acid and liquid sodium silicate. Ships 50% sodium hydroxide and sulfuric acid.[1]	Tanks for 476,000 gallons 50% sodium hydroxide solution, 520,000 gallons sulfuric acid and 1,828,000 gallons sodium silicate.[6]
48	U.S. Gypsum Dock	Receives gypsum rock and aragonite sand.[1]	Storage for 60,000 tons of gypsum rock and 20,000 tons of aragonite sand.[6]
49	Hawkins Point Marine Terminal (MPA)	Receives alumina, liquid fertilizer and cement.[1]	Storage for 64,000 tons of alumina, 75,000 tons of cement and tanks for 3,640,000 gallons of fertilizer.[6]

=Publicly-owned facility

[8] Information is for combined operations.

Table B2. Terminal Truck and Rail Service[9]

ID	Name	Daily Truck Volume In/Out	Nearest Interstate Facility (:) and Principal Access Roads to Facility	Rail Service
1	Pennwood Wharf (Mittall)	110/96	**MD 695:** Wharf Road, Bethlehem Road (MD 158), Peninsula Expressway (MD 157)	Patapsco and Back Rivers Railroad, but rail trestle approaches were not usable as of 1999.[4]
2	Mittal Steel Ore Pier	149/115	**MD 695:** MD 151, Wharf Road, Bethlehem Road (MD 158), Peninsula Expressway (MD 157)	Patapsco and Back Rivers Railroad.[4]
3	Chesapeake Bulk Stevedores	N/A	**MD 695:** MD 151, Wharf Road, Bethlehem Road (MD 158), Peninsula Expressway (MD 157)	Patapsco and Back Rivers Railroad.[4]
4	Baltimore Marine Industries	56/147	**MD 695:** Shipyard Road, Riverside Drive, Bethlehem Road (MD 158), Peninsula Expressway	Patapsco and Back Rivers Railroad.
5	Dundalk Marine Terminal (MPA)	913/963	**MD 695**:Broening Highway MD 695 west. **I-95**: Broening Highway, Keith Ave	Norfolk Southern.[4]
6	Seagirt Marine Terminal (MPA)	879/960[6]	**MD 695:** Broening Highway **I-95:** Broening Highway, Keith Ave	None.
7	Seagirt Intermodal ICTF	189/168.[6]	**I-95:** Vail Street, Keith Avenue	CSX Railroad.
8	Canton Railroad (Penn Mary)	N/A	**I-95:** Holabird Avenue, Ponca Street, Interstate Avenue	Norfolk Southern, CSX, and Canton Railroads.
9	9. National Gypsum	166/191.[10]	**I-95:** Newkirk Street, Boston Street	None.[4]
10	Canton Marine Terminal Pier 13	N/A	**I-95:** Newgate Avenue, New Vail Street, Keith Avenue	Norfolk Southern[4]
11	Canton Pier 10/11 (Vane)	N/A	**I-95:** Newgate Avenue, New Vail Street, Keith Avenue	Class 1 railroads.[3]

=Publicly-owned facility

[9] See maps throughout section three of this report. Note: Truck counts were not taken for some terminals. These terminals, identified by "N/A" in the truck volume column, were observed or believed to generate relatively few truck trips relative to the Port's major truck generators.

[10] Count taken by Sabra-Wang on 2/3/05.

Table B2 (continued).

ID	Name	Daily Truck Volume In/Out	Nearest Interstate Facility (:) and Principal Access Roads to Facility	Rail Service
12	CNX	N/A	**I-95:** Newgate Avenue, New Vail Street, Keith Avenue	Norfolk Southern.
13, 14, 16, 17, 19[11]	Rukert Terminals Corporation	661/ 633.[12]	**I-95:** Clinton Street, Keith Avenue	Norfolk Southern[4], Canton Railroad[1].
15	Lehigh Portland Cement	67/ 68.[13]	**I-95:** Mertens Avenue, Keith Avenue	N/A
18	Clinton Street Marine Terminal (MPA)	N/A	**I-95:** Clinton Street, Keith Avenue	Not used for cargo through port.
20	Highland Terminal	N/A	**I-95:** Holabird Avenue, Clinton Street, Boston Street	Canton Railroad.[5]
21	Petroleum Fuel and Terminal Company (Apex)	N/A	**I-95:** Holabird Avenue, Clinton Street, Boston Street	None
22	Belt's Business Center (U.S. Customs Station)	74/76.[14]	**I-95:** Dundalk Avenue, Eastern Avenue	None.
23	Norfolk Southern (Bayview Intermodal Yard)	75/ 67.[14]	**I-95:** Ponca Street, Eastern Avenue	Norfolk Southern
24	General Ship Repair	N/A	**I-95**: Key Highway East, Key Highway south	Not used for cargo through port.
25	Domino Sugar	88/95[14]	**I-95**: Key Highway East, Key Highway south	CSX Railroad.

= Publicly-owned facility

[11] Information is for combined operations.

[12] Count taken by Sabra-Wang on 1/27/05. Number given is the sum of trucks to / from all three Rukert Terminals.

[13] Count taken by Sabra-Wang on 1/27/05.

[14] Count taken by Sabra-Wang on 1/20/05.

Table B2 (continued).

ID	Name	Daily Truck Volume In/Out	Nearest Interstate Facility (:) and Principal Access Roads to Facility	Rail Service
26	Locust Point Grain Elevator	N/A	No longer operational.	N/A
27	North Locust Point Marine Terminal (MPA)	537/ 510[14]	**I-95**: Mc Comas Street	CSX Railroad
28	Baltimore Metals and Commodities Terminal	N/A	**I-95:** Fort Avenue, Lawrence Street, Key Highway	CSX Railroad
29	South Locust Point Marine Terminal (MPA)	64/79.[15]	**I-95:** Mc Comas Street	CSX Railroad, 620,000 square feet of covered storage space
30	Tyco Submarine Systems	N/A	**I-95:** Mc Comas Street	CSX Railroad
31	Masonville Marine Terminal (ATC, MPA)	55/49.[16]	**I-895:** Frankfurst Avenue, Childs Street	CSX Railroad
32	Fairfield Auto Terminal (MPA)	26/ 35.[17]	**I-895:** Childs Street, Frankfurst Avenue	None[4]
33	Atlantic Terminals	31/31.[17]	**I-895:** Childs Street, Frankfurst Avenue	CSX Railroad.
34	ST Services	N/A	**I-895:** Frankfurst Avenue, Childs Street	CSX Railroad.
35	Port Liberty	N/A	**I-895:** Frankfurst Avenue, Childs Street	
36	Chesapeake Terminals	52/ 65.[7]	**I-895:** Chesapeake Avenue, Vera Street, Frankfurst Avenue, Childs Street	None.[4]
37	Baltimore Asphalt Refinery Dock (Chevron USA)/ Liquid Transfer Terminals[17]	N/A	**I-895:** Chesapeake Avenue, Vera Street, Frankfurst Avenue, Childs Street	None.[4]

= Publicly-owned facility

[15] Count taken by Sabra-Wang on 2/2/05.

[16] Count taken by Sabra-Wang on 2/1/05.

[17] The Baltimore Asphalt Refinery Dock was not operational as of 1999 according to the U.S. Army Corps of Engineers Port Series No. 10. The Liquid Transfer Terminal is located adjacent to the Baltimore Asphalt Refinery Dock, but is not listed on the Port of Baltimore Truckers Guide Map which is the base document used for numbering the terminal facilities in this report. The information in this section is that of the Liquid Transfer Terminal and not that of the Baltimore Asphalt Refinery Dock.

Table B2 (continued).

ID	Name	Daily Truck Volume In/Out	Nearest Interstate Facility (:) and Principal Access Roads to Facility	Rail Service
38	Condea Vista Company	N/A	**MD 695:** Fairfield Road, Patapsco Avenue, Pennington Avenue, Ordnance Road, MD 10 (Arundel Freeway)	CSX Railroad.[4]
39	Citgo / Tosco	N/A	**MD 695:** 4th Avenue north Northbridge Avenue, Fairfield Road, Patapsco Avenue, Pennington Avenue, Ordnance Road south, MD 10 (Arundel Freeway)	CSX Railroad.[4]
40, 41, 42[18]	CSXT Chesapeake Coal and Ore Piers, CSXT Shiploader Pier	N/A	**MD 695:** Patapsco Avenue, Pennington Avenue, Ordnance Road, MD 10 (Arundel Freeway)	CSX Railroad
43	Amerada Hess Dock	192/223[14]	**MD 695:** Pennington Avenue, Ordnance Road, MD 10 (Arundel Freeway), Hawkins Point Road, Quarantine Road	None.[4]
44	Amoco Oil Company	N/A	**MD 695:** Pennington Avenue, Ordnance Road, MD 10 (Arundel Freeway), Hawkins Point Road, Quarantine Road	CSX Railroad.[4]
45	U.S. Coast Guard Yard	40/ 39.[14]	**MD 695**: Coast Guard Yard Road, Hawkins Point Road, Quarantine Road	None.[4]
46	Blue Circle Cement		**MD 695:** Chemical Road, Hawkins Point Road, Quarantine Road	None.[4]
47	Grace, W.R. & Co., Davison Chemical Wharf	70/ 83.[4]	**MD 695:** Chemical Road, Hawkins Point Road, Quarantine Road	CSX Railroad.[4]
48	U.S. Gypsum Dock	137/139.[19]	**MD 695:** Quarantine Road	CSX Railroad.[4]
49	Hawkins Point Marine Terminal (MPA)	N/A	**MD 695:** Hawkins Point Road, Dock Road, Fort Armistead Road, Fort Smallwood Road	CSX Railroad.[4]

= Publicly-owned facility

[18] Information is for combined operations.

[19] Count taken by Sabra-Wang on 2/10/05.

Appendix C

Terminal Clusters and Highway Access Routes

Figure C1. Dundalk and Seagirt

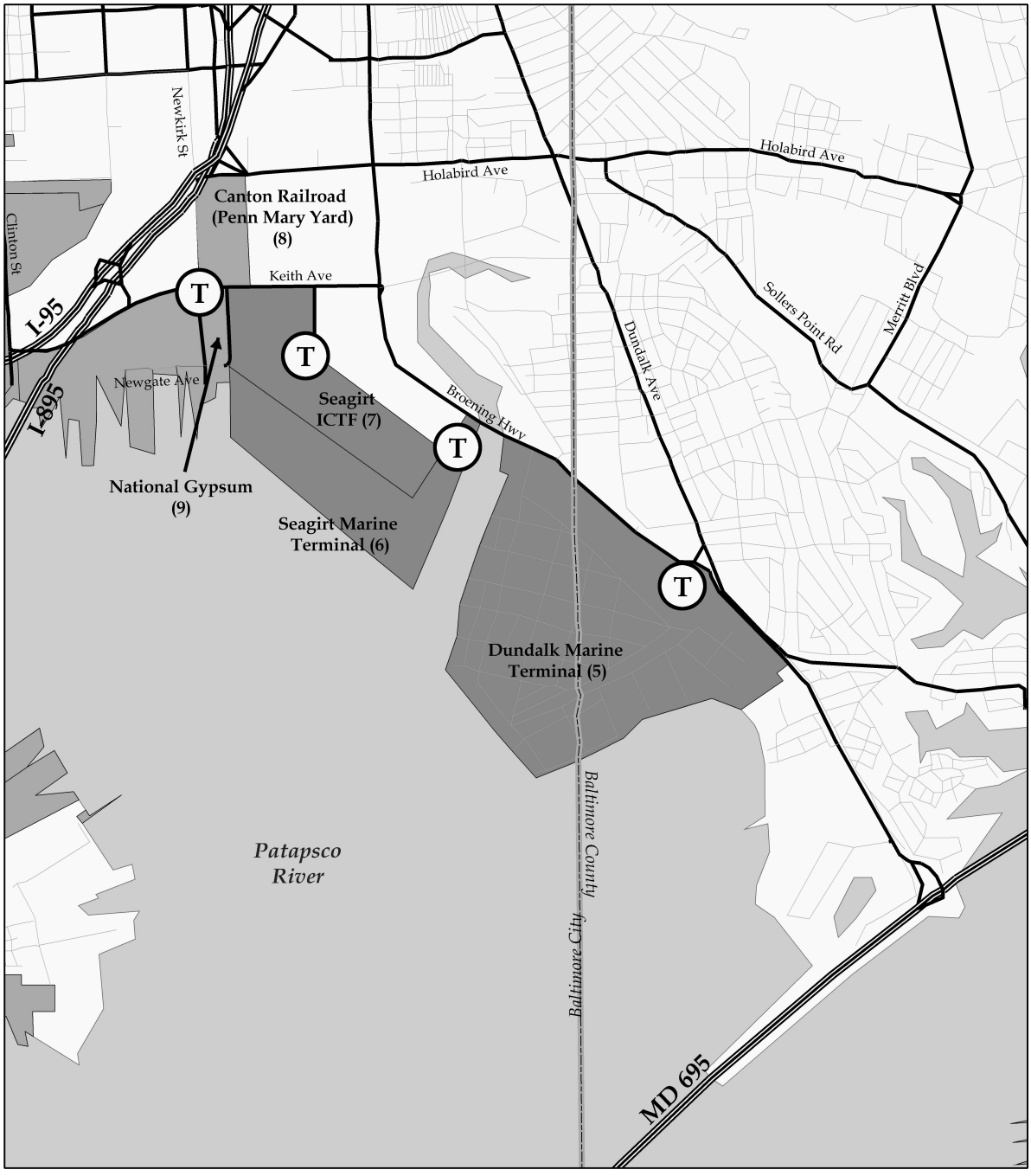


Figure C2. Canton

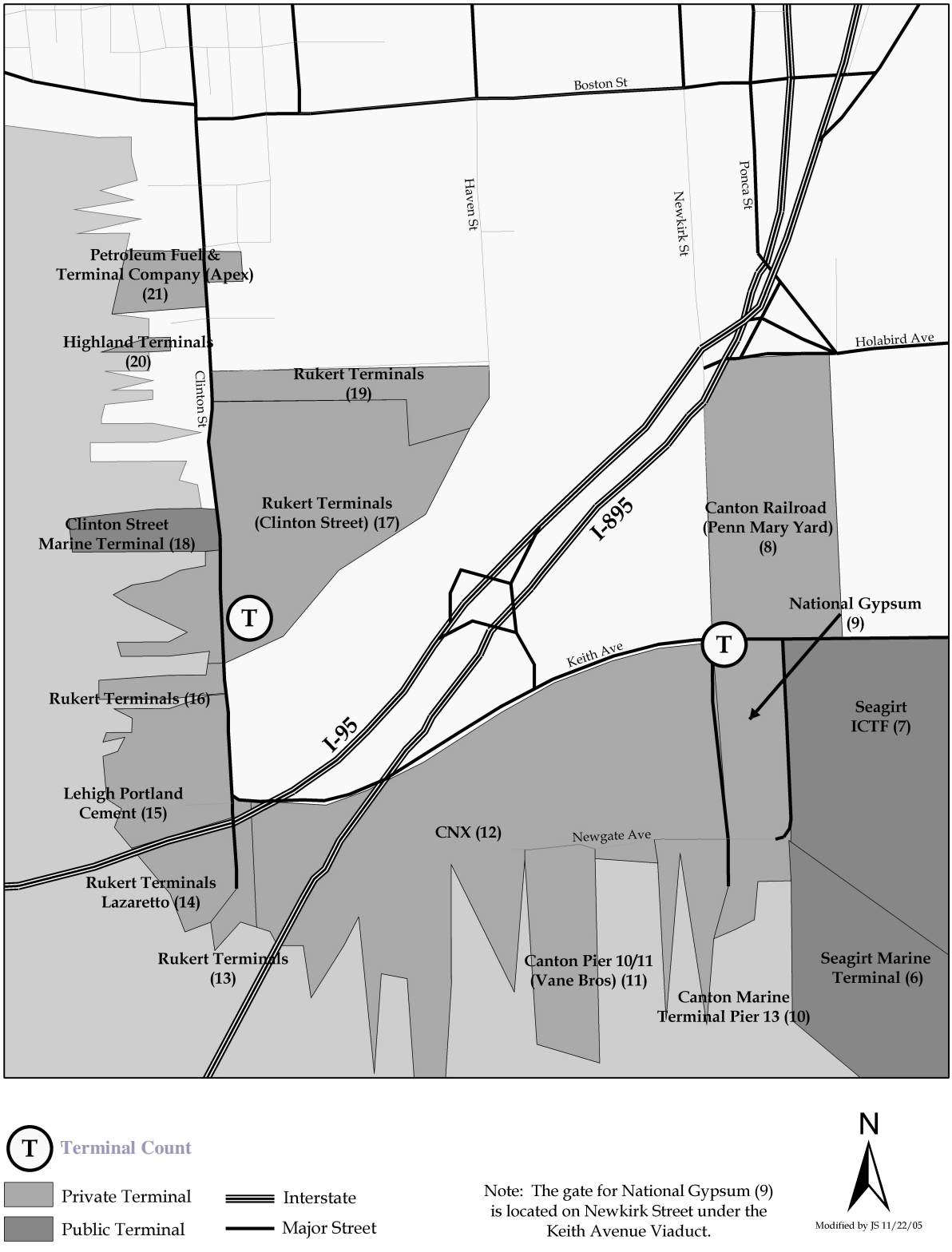


Figure C3. Locust Point

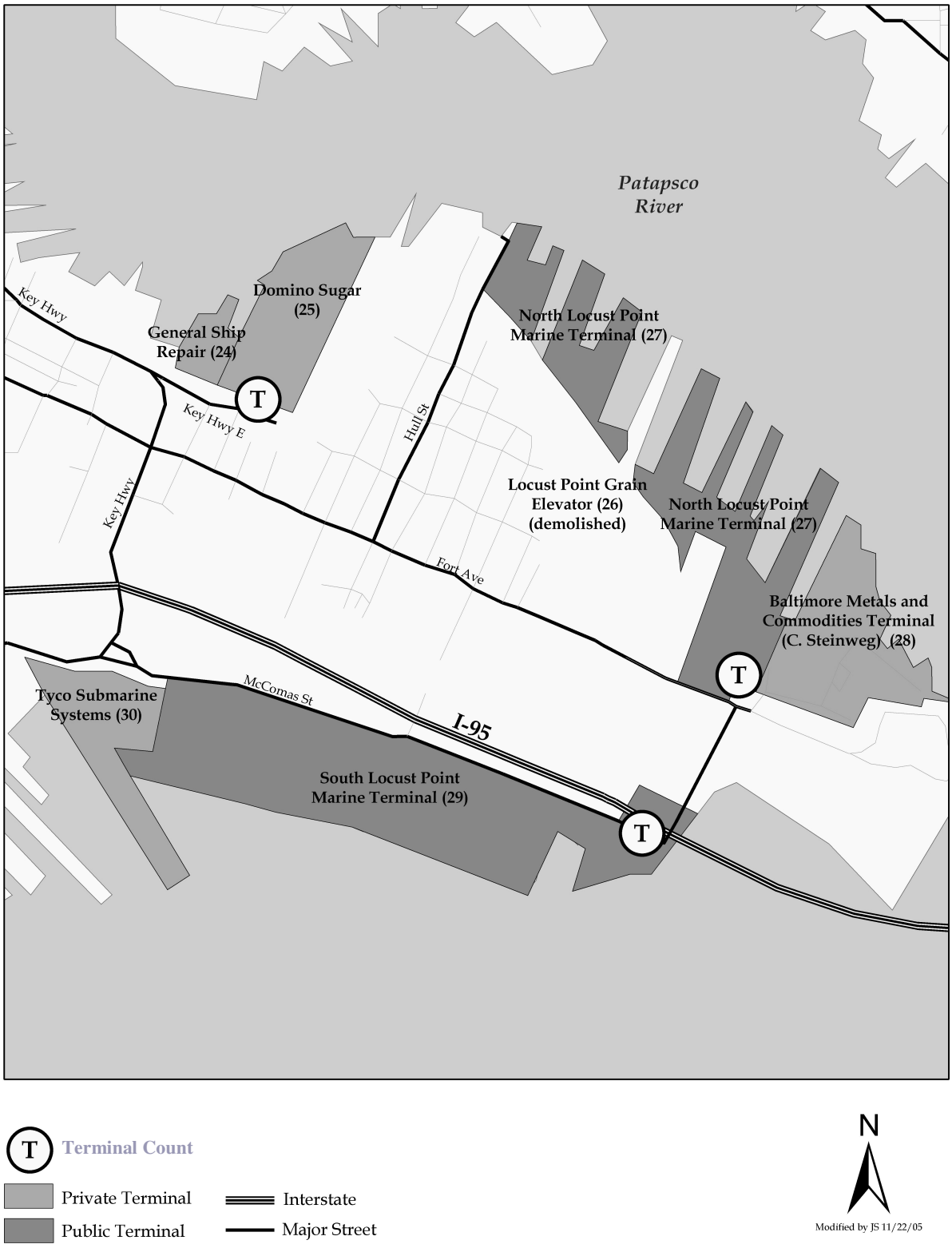


Figure C4. Fairfield

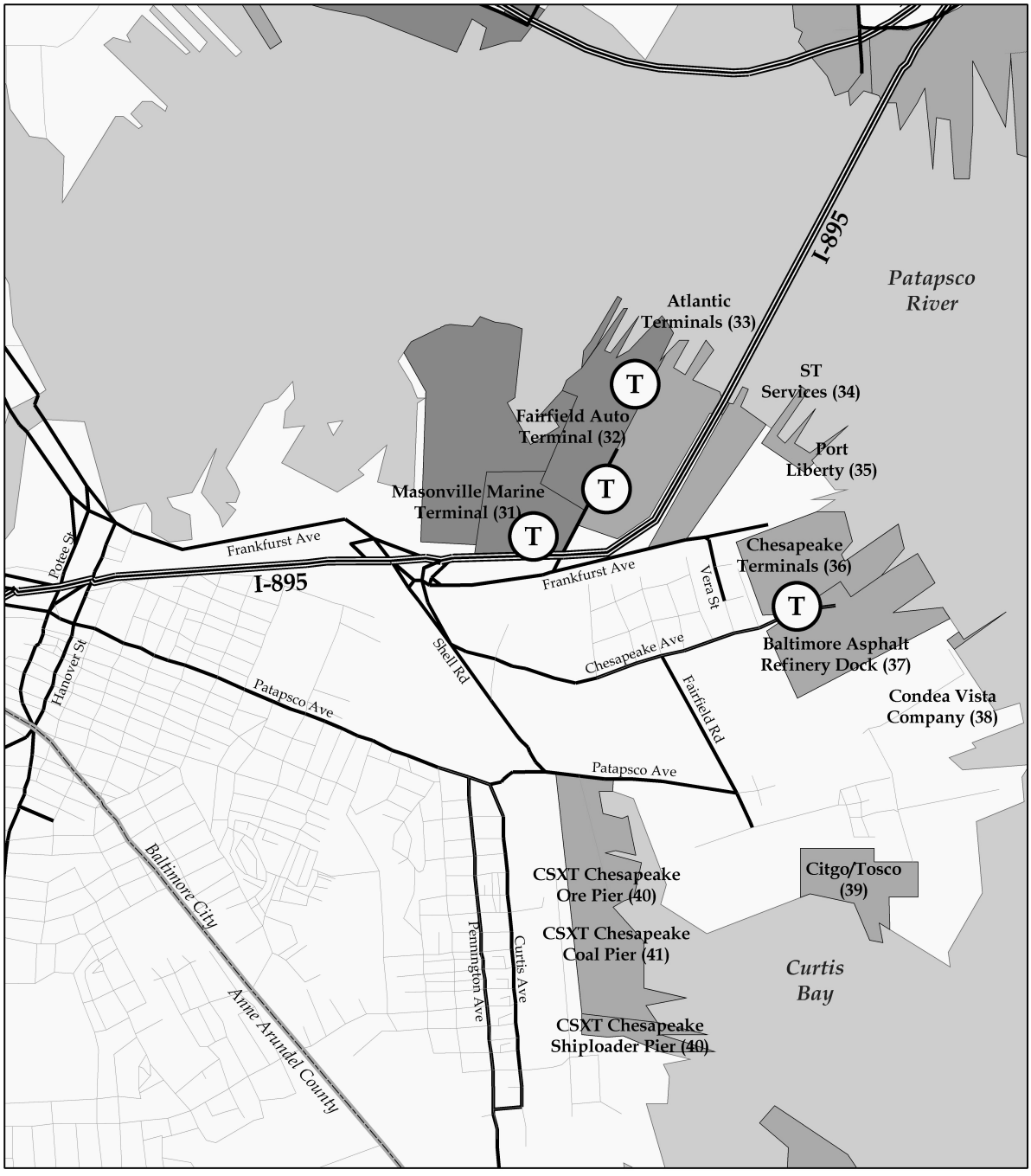


Figure C5. Curtis Bay / Hawkins Point

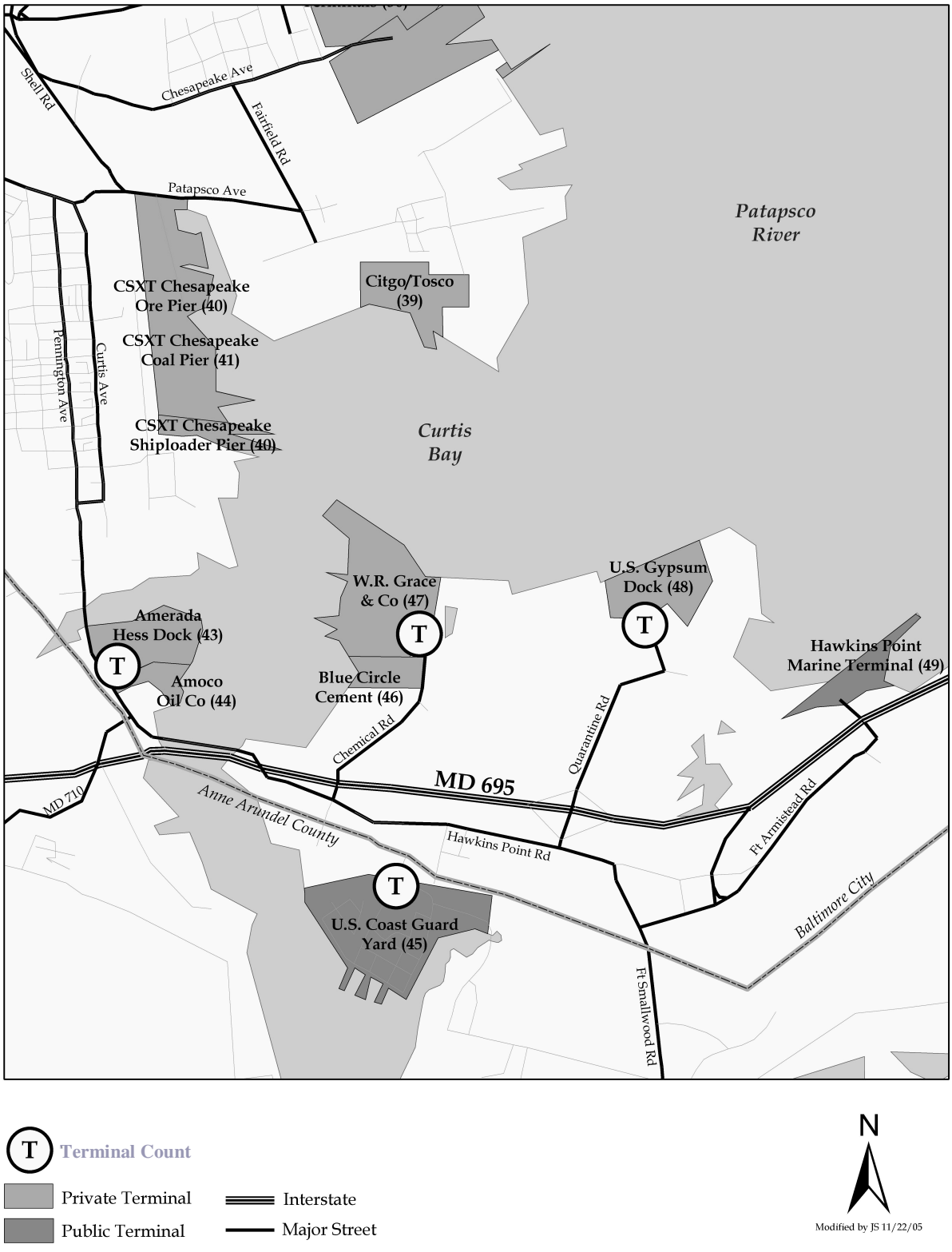


Figure C6. Sparrows Point

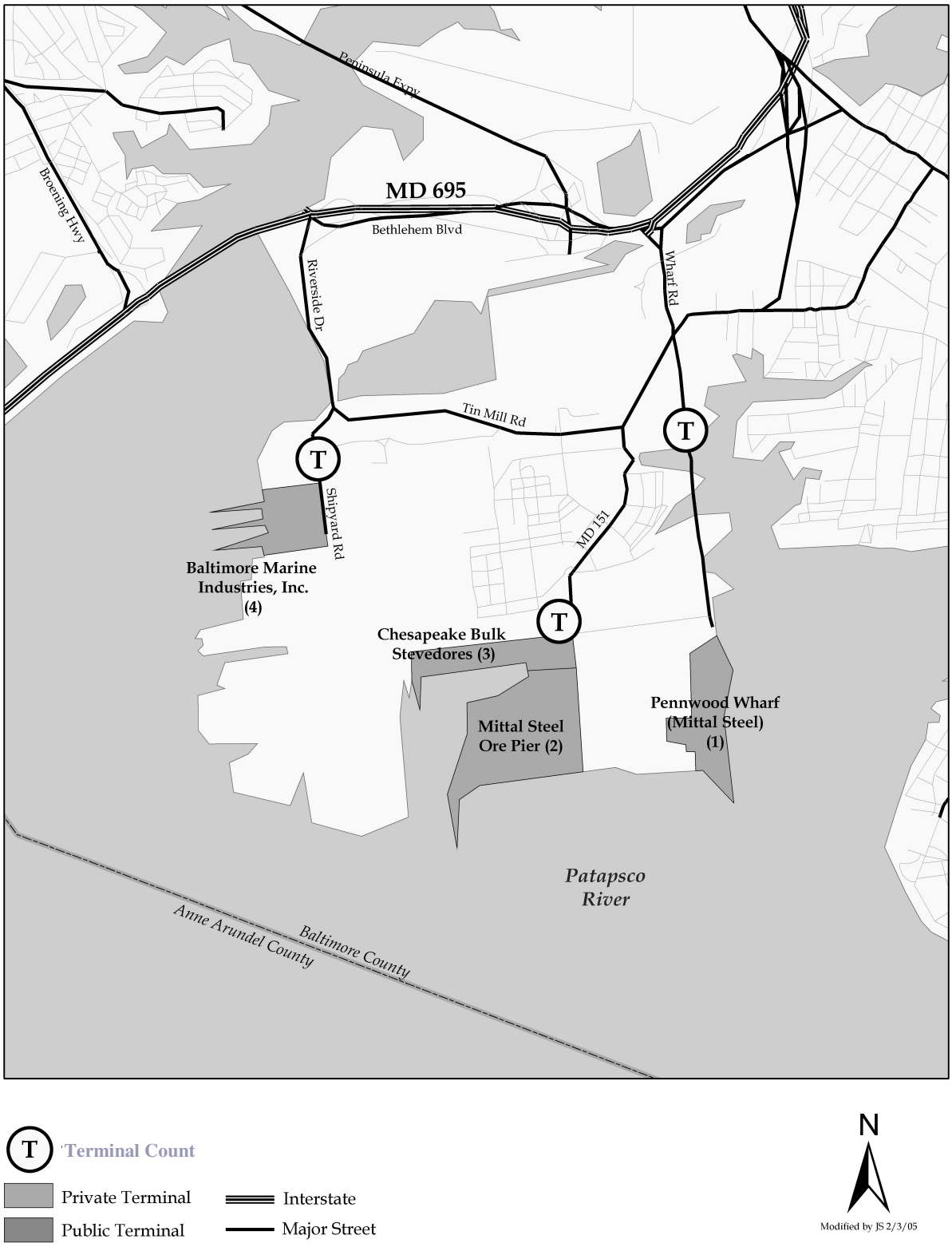


Figure C7. Highlandtown

Appendix D

Railroads Serving the Port of Baltimore

D.1 Amtrak

Amtrak (National Rail Passenger Corporation) does not provide any freight service to the Port of Baltimore and its operations are primarily related to intercity passenger rail. However, because Amtrak provides NS with its principal Interstate access to the Port of Baltimore, it is worth noting Amtrak's role in serving the Port. NS operates over Amtrak's Northeast Corridor line between Washington, D.C. and Northern New Jersey.

D.2 CSX Transportation (CSXT) and CSX Intermodal (CSXI)[1]

CSX is a Class I railroad operating the most extensive rail network at the Port of Baltimore. CSX provides the port with national rail connections through CSXT (which owns track and provides carload service) and CSXI (which provides intermodal service).

D.2.1 Ownership & History

CSX is a division of the Jacksonville based CSX Corporation. CSX acquired most of its current Maryland assets through the merger of the Chessie System Railway and Seaboard Coast Line Industries in 1982.

D.2.2 Infrastructure & Connections

CSX currently operates over 432 route miles in Maryland and serves the Port of Baltimore via five interstate main routes:

- Eastern Gateway Corridor – Baltimore to Chicago via Cumberland and Pittsburgh
- St. Louis Gateway Corridor – Baltimore to St. Louis via Cumberland, Pittsburgh, and Indianapolis
- Memphis Gateway Corridor – Baltimore to Memphis via Cumberland, Cincinnati, and Nashville
- Atlantic Coast Corridor – Florida to Boston via Savannah, Baltimore, and New York

[1] CSXT, Maryland Port Administration, and Maryland Department of Business and Economic Development

- New Orleans Gateway Corridor – New Orleans to New York via Atlanta, Richmond, and Baltimore

All five of CSX's primary interstate routes converge in Baltimore, allowing the railroad to expeditiously serve markets throughout the country from the Port of Baltimore. The Eastern Gateway Corridor runs west of Baltimore to Point of Rocks, Maryland where it connects with another CSX main line from Washington, D.C. The St. Louis Gateway and Memphis Gateway Corridors follow the same route as the Eastern Gateway Corridor from the Port of Baltimore westbound. The Atlantic Coast Corridor links the Port of Baltimore to markets as far south as Miami and as far north as Maine. The Atlantic Coast Corridor roughly follows I-95 along the Eastern Seaboard and connects the Port of Baltimore to major yards and terminals in Northern New Jersey on the north and Richmond to the South. Finally, the New Orleans Gateway Corridor follows the Eastern Seaboard Corridor south of Baltimore along the Camden Line to Washington, D.C and then to Richmond, Virginia.

In the Port vicinity, CSX interchanges with the Canton Railroad, the Patapsco & Back Rivers Railroad, Amtrak, and Norfolk Southern.

CSX, through trackage rights agreements, also operates over portions of the Canton Railroad, Amtrak, and Norfolk Southern lines in the Port vicinity.

CSX Intermodal operates the Intermodal Container Transfer Facility (ICTF) north of Seagirt Marine Terminal. CSXI also provides truck drayage of trailers to its ICTF from various terminals. Once the trailers arrive at the ICTF, they are loaded onto flatcars for rail transport. CSXI has dockside truck access for this purpose at Dundalk, Seagirt, and North and South Locust Point Terminals.

D.2.3 Commodities and Industries Served

Each year, CSX carries approximately 800,000 carloads through Maryland. Some of the top commodities include metal products (steel and aluminum) and chemicals (petroleum products and plastics). At the Port of Baltimore, CSX moves metals, chemicals (mostly fertilizer), automobiles, containers, lumber/paper products, and bulk commodities (coal for export to overseas markets).

As mentioned previously, CSX serves intermodal customers via the 70-acre Seagirt Intermodal Container Transfer Facility (ICTF). The ICTF railhead serves several terminal facilities via rail links and is also fed by truck drayage from terminals without rail access. The majority of traffic handled at the yard is actually containers moving across the U.S. (to/from west coast ports and inland locations), rather than containers handled through the Port of Baltimore. The ICTF is also served by the Norfolk Southern Railway. The Canton Railway provides switching service to CSX and NS at the ICTF.

D.3 Canton Railroad (CTN)

The Canton Railroad Company is a short line Class III switching railroad operating in Baltimore City and Baltimore County. The Canton Railroad primarily serves industrial customers in the Port area, including manufacturing and distribution centers and Port related shippers. It provides important access and switching services for the Class I railroads serving the Port of Baltimore.

D.3.1 Ownership & History

The Canton Railroad was chartered in 1906. It is now a subsidiary of the Canton Development Company (CDC), which is owned by the Maryland Transportation Authority. The Authority purchased the CDC in order to preserve rail access to the Seagirt Marine Terminal and the ICTF.

D.3.2 Infrastructure & Connections

The Canton Railroad operates over six miles of main line and 17 miles of secondary track. The company offers just-in-time switching operations for its Class I connecting railroads. The Canton Railroad interchanges with CSX at the ICTF. Also, CSX and Norfolk Southern, through trackage rights agreements, can operate over the Canton Railroad. The Canton Railroad also operates the Boston Street Bulk Terminal. This facility specializes in the transfer of bulk cargo to/from trucks and can accommodate up to 30 railcars per day. The terminal typically handles chemicals, minerals, and food grade products.

D.3.3 Commodities and Industries Served

The Canton Railroad serves a diverse group of approximately 30 customers, as shown in Table D.1 on the following page.

Table D1. Canton Railroad Shippers

Unilever Corporation: Soap Manufacturer	**Rukert Terminals:** Bulk Stevedore/Warehouse	**C. Steinweg:** Metals Distribution (LME)
GAF Building Materials: Asphalt Roofing Shingles	**Transcom Terminals:** Bulk Stevedore	**Warner Graham:** Ethyl Alcohol Distributor
Lehigh Cement: Cement Distributor	**CNX Marine Terminals:** Bulk Stevedore	**Apollo Warehouse:** Warehouse
ISP Minerals: Roofing Granules	**Titan Steel:** Metals Distributor	**Overflo Public Warehouse:** Warehouse
Owens Brockway: Plastics Manufacturer	**Baltimore Packaging:** Warehouse/Steel	**Shipside Marine Packaging:** Warehouse
Consolidated Container: Plastics Manufacturer	**Pemco:** Glazing Compounds Mfg	**Maryland Overpak:** Warehouse/Packager
Henry Bath: Metals Distribution (LME)	**A.E. Stanley:** Bulk Starch Distribution	**IMERYS:** Minerals Supplier
National Gypsum: Wallboard Manufacturer	**Freestate Steel:** REBAR Distribution	**Fleischmann's Vinegar:** Ethyl Alcohol
Terminal Corporation: Warehouse	**IMC/Agrico:** Bulk Fertilizer	**Weyerhaeuser:** Lumber Building Supply
Cambridge Iron & Metal: Scrap Metal	**Belair Road Supply:** Brick/Building Supply	

Source: Canton Railroad

D.4 Norfolk Southern[2]

The Norfolk Southern Railway is a Class I railroad providing service to the Eastern U.S. from the Port of Baltimore.

D.4.1 Ownership & History

Norfolk Southern is a publicly-traded corporation based in Norfolk, Virginia. NS provides service to 22 eastern states, the District of Columbia, and the province of Ontario in Canada. The Railroad was formed in 1982 through the union of the Norfolk & Western Railway and the Southern Railway Company.

[2] Norfolk Southern Railway, Maryland Port Administration, and Maryland Department of Business and Economic Development

D.4.2 Infrastructure & Connections

Within the State of Maryland, NS operates over 287 route miles. Most of NS's Maryland main lines are located outside of the Port vicinity, but the railroad owns an extensive secondary and yard network at the Port. Consequently, NS must rely on trackage rights agreements with Amtrak and CSXT to link its Port operations to its national network. From the Port vicinity, NS carries freight via Amtrak's Northeast Corridor northbound to Philadelphia and then to NS's terminals and interchanges in Northern New Jersey. NS also utilizes the Northeast Corridor northbound to Perryville, Maryland where the Amtrak line interchanges with the NS-owned Port Line Road to Harrisburg. Harrisburg is the site of major NS yards from which traffic can be routed to the entire NS network. NS also uses Amtrak to access the Port from the South via Washington, D.C. to the NS-owned main line beginning in Arlington, Virginia. South of Arlington at Manassas, Virginia, NS's main line spits into the Piedmont and Shenandoah Routes, which provide service to customers throughout the Southern U.S. NS also connects with the Canton Railroad just north of the ICTF and with the Patapsco & Back Rivers Railroad, the switching railroad for Sparrows Point.

NS offers double stack intermodal service to the Midwest, including the first single-line service between Maryland and Kansas City rail terminals. NS also operates a major intermodal yard just north of the Port at 4800 Lombard Street with trailer and container loading facilities.

D.4.3 Commodities and Markets

Nationally, NS's top commodity by tonnage is coal. At the Port of Baltimore, coal is also NS's top commodity by tonnage. The railroad delivers export utility coal to Consol Energy's CNX Marine Terminal, which has an annual throughput capacity of 1.5 million tons and storage space for up to 1.2 million tons. The facility is open continuously (24 hours per day) and has shiploader equipment that can load 7,000 tons of coal per hour into berthed vessels. In addition to the CNX Terminal, NS serves bulk facilities at Sparrows Point (Terminal Corporation), the Rukert Terminal and the NS Thoroughbred Bulk Terminal (agricultural and chemical commodities) just north of Downtown Baltimore near I-83.

NS serves several steel distribution facilities and terminals in the Port vicinity, including Montgomery Maintenance Incorporated, Rukert Terminals, Shipside Marine (also served by CSXT), Heidtman Steel Products, Overflo Public Warehouse (via Canton Railroad), and Universal Distribution Services. The railroad also distributes lumber products from the Terminal Corporation and Shipside Marine. NS also moves export automobiles from the Dundalk Marine Terminal, where the railroad maintains 26 car carrier railcar spots.

Finally, through its East Baltimore Intermodal Yard, NS provides the only westbound (to Harrisburg) double-stack container service from the Port.

D.5 Patapsco & Back Rivers Railroad (PBR)

The Patapsco & Back Rivers Railroad (PBR) is a Class III switching railroad principally serving the Sparrows Point steel facility.

D.5.1 Ownership & History

The PBR is a subsidiary of BethIntermodal, a division of Bethlehem/International Steel Group. BethIntermodal is a multimodal logistics company that offers transload and storage capabilities to its customers.

D.5.2 Infrastructure & Connections

The PBR operates over 160 miles of track at Sparrows Point and provides warehouse, open storage, and port access to the International Steel Group at Sparrows Point. The railroad interchanges with CSXT and NS at Grays Yard of the Edgemere neighborhood in southeast Baltimore. The railroad also operates over a short spur to the North Point Industrial Center adjacent to the Sparrows Point Country Club.

Appendix E

Land Use Plans

Table E1. Characteristics of Existing Built Space in the Port Focus Areas

Port Focus Area	# Buildings	Square Feet	Vacancy Rate	Average Rent
Baltimore City				
Canton	31	2,987,141	12%	$3.25
Holabird	25	1,795,539	9%	$4.50
Carroll Camden	57	4,777,933	22%	$4.50
Fairfield/ Curtis Bay	37	2,208,796	20%	$3.40
Locust Point	18	828,349	6%	N/A
Baltimore County				
North Point	77	5,389,591	18%	$3.73

Source: CoStar Reports. Generated October 27, 2004

Table E2. Vacant Land: Port Focus Areas in Baltimore County, June 2005

Focus Area	Predominant Land Use	Water Dependent Users	Vacant Land Disposition Sites	Acres	Status
MD 43	Industrial, Flex Space, and undeveloped land	Mixed-use proposed along the waterfront along the perimeter of Lockheed Martin Industrial Uses	Baltimore Crossroads @95 and Windlass Run Development	473 acres north of Eastern Avenue	5.5 million square feet of space planned
			Land surrounding industrial uses at Lockheed Martin at Dark Head Cove	143	Development options under review for LMC site
North Point	Manufacturing, Warehouse, Distribution	Deep-water at south and west side of Sparrows Point	1,100 acres in Sparrows Point owned by Mitall Steel Company previously were identified by ISG as disposition sites. Scattered sites are also available around Kelso Drive and Quad Avenue.	1,298	The status of Sparrows Point sites will be dependent on the plans of the new owners. The County plans to extend Kelso Drive which will provide access to 100 acres

Source: PLUDAC

Table E3. Vacant Land: Port Focus Areas in Baltimore City, June 2005

Focus Area	Predominant Land Use	Water Dependent Users	Vacant Land Disposition Sites	Acres	Status
Canton	Industrial, Maritime	Yes	Exxon: In-fill development opportunities exist within the footprint of other existing users at both marine terminals and within privately owned property	80	Undergoing environmental remediation
			General Motors: Broening Highway Plant	182	Property offered for during summer 2005
Holabird	Industrial / Office Park	No	N/A	N/A	N/A
Carroll-Camden	Heavy Industrial and Mixed-Use	Mixed-use proposed along the waterfront	Sites have been identified for acquisition and assembly under the Carroll Camden Urban Renewal Plan	Scattered sites	Various
Locust Point	Industrial, Maritime, Mixed-Use and Residential	Yes	CSX	8	Seeking rail customers
			General Electric Site undergoing environmental remediation		
Port Covington	Retail, vacant land, MARAD ships	Yes	Project pending for ship repair and mixed-use development on vacant land	13	Subject to a Planned Unit Development
Fairfield	Industrial, Maritime and Manufacturing	Yes	Fishing Point LLC	60	Purchased May 2005
			Tosco Site	20	Under contract
			Baltimore City assembling property pursuant to Urban Renewal Plan	N/A	On-going
Curtis Bay	Industrial, Maritime and Manufacturing; Rail Switching Yard	Yes	General Chemical	40	Negotiations Underway
			American Recovery	15	N/A
Hawkins Point	Heavy Industrial, Landfills	Yes	No free-standing sites currently identified. In-fill opportunities may exist. MdTA is negotiating to acquire property for a training facility.	N/A	N/A

Source: PLUDAC

Appendix F

Traffic Counts and Current Level of Service Analyses

Table F1. Vehicle Classifications Summary, AM and PM Peak Hour

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary			AM PEAK HOUR 7:00 - 8:00						PM PEAK HOUR 5:00 - 6:00					
			Non-Trucks		All Trucks		All Vehicles		Non-Trucks		All Trucks		All Vehicles	
			Class 1-4		Class 5-13		Class 1-13		Class 1-4		Class 5-13		Class 1-13	
		Count Date	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct
1 MCCOMAS,	EAST	08/12/2003	81	73%	30	27%	110	100%	160	98%	3	2%	163	100%
E of Hanover St	WEST	08/12/2003	285	91%	28	9%	313	100%	222	92%	20	8%	241	100%
2 FORT AVE	EAST	08/13/2003	103	94%	6	6%	109	100%	170	95%	9	5%	179	100%
E of Hull Street	WEST	08/13/2003	99	94%	7	6%	105	100%	237	96%	9	4%	246	100%
4 HOLABIRD,	EAST	03/24/2004	447	79%	117	21%	563	100%	665	90%	71	10%	736	100%
W of Broening	WEST	03/24/2004	604	86%	100	14%	704	100%	440	87%	67	13%	506	100%
5 KEITH,	NORTH	07/23/2003	462	87%	70	13%	532	100%	289	87%	42	13%	331	100%
S of Clinton St	SOUTH	07/23/2003	371	87%	56	13%	427	100%	265	91%	25	9%	290	100%
6 DUNDALK,	NORTH	03/24/2004	1,006	95%	51	5%	1,057	100%	846	95%	48	5%	894	100%
N of Holabird St	SOUTH	03/24/2004	704	92%	58	8%	762	100%	882	96%	40	4%	921	100%
7 BROENING,	NORTH	03/24/2004	161	90%	18	10%	179	100%	286	84%	53	16%	338	100%
S of Holabird	SOUTH	03/24/2004	404	82%	90	18%	494	100%	178	86%	30	14%	207	100%
8 HANOVER	NORTH	11/10/2004	433	79%	113	21%	546	100%	554	81%	130	19%	684	100%
POTEE, S Waterview	SOUTH	11/10/2004	892	84%	174	16%	1,066	100%	580	87%	89	13%	669	100%
9 PATAPSCO	EAST	11/10/2004	312	80%	80	20%	392	100%	351	87%	54	13%	405	100%
E of Hanover	WEST	11/10/2004	168	84%	31	16%	199	100%	190	90%	22	10%	212	100%
10 PENNINGTON,	2-WAY	05/16/2001	329	81%	79	19%	408	100%	477	88%	68	12%	545	100%
S of Aspen														
11 SHELL RD,	NORTH	07/08/2003	63	49%	66	51%	129	100%	93	82%	21	18%	113	100%
S of Frankfurst	SOUTH	07/08/2003	267	85%	47	15%	314	100%	171	83%	36	17%	206	100%

Table F1. Vehicle Classifications Summary, AM and PM Peak Hour (continued)

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary				AM PEAK HOUR 7:00 - 8:00						PM PEAK HOUR 5:00 - 6:00					
				Non-Trucks		All Trucks		All Vehicles		Non-Trucks		All Trucks		All Vehicles	
				Class 1-4		Class 5-13		Class 1-13		Class 1-4		Class 5-13		Class 1-13	
			Count Date	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct
11	SHELL RD,	NORTH	07/08/2003	63	49%	66	51%	129	100%	93	82%	21	18%	113	100%
	S of Frankfurst	SOUTH	07/08/2003	267	85%	47	15%	314	100%	171	83%	36	17%	206	100%
12	FRANKFURST W of Childs	2-WAY	06/06/2001	167	74%	57	26%	224	100%	256	83%	53	17%	309	100%
13	CHILDS,	NORTH	07/08/2003	64	84%	13	16%	76	100%	12	80%	3	20%	15	100%
	N of Frankfurst	SOUTH	07/08/2003	39	88%	6	13%	44	100%	35	92%	3	8%	38	100%
14	CHEMICAL RD,	NORTH	07/16/2003	91	79%	25	21%	115	100%	15	81%	4	19%	19	100%
	N of Hawkins Point Rd	SOUTH	07/16/2003	67	79%	18	21%	84	100%	79	90%	9	10%	87	100%
15	QUARANTINE RD,	NORTH	07/08/2003	454	83%	91	17%	544	100%	396	89%	50	11%	446	100%
	N of Hawkins Point	SOUTH	07/08/2003	176	71%	73	29%	248	100%	222	84%	43	16%	265	100%
16	GOV RITCHIE HWY,	NORTH	02/26/2002	985	98%	22	2%	1,007	100%	564	97%	20	3%	584	100%
	S of Patapasco	SOUTH	02/26/2002	521	94%	35	6%	555	100%	1,206	98%	22	2%	1,228	100%
17	HAWKINS POINT RD	EAST	11/09/2004	166	75%	56	25%	222	100%	263	87%	40	13%	303	100%
	Chem Rd to Quar	WEST	11/09/2004	268	76%	87	24%	354	100%	190	85%	34	15%	224	100%
18	HANOVER ST, N of Cromwell	2-WAY	06/27/2001	1,119	90%	131	10%	1,250	100%	1,283	93%	101	7%	1,384	100%
19	BOSTON ST,	EAST	07/15/2003	381	91%	39	9%	420	100%	500	95%	28	5%	528	100%
	W of Ponca	WEST	07/15/2003	548	92%	50	8%	597	100%	447	95%	25	5%	472	100%

Table F1. Vehicle Classifications Summary, AM and PM Peak Hour (continued)

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary				AM PEAK HOUR 7:00 - 8:00						PM PEAK HOUR 5:00 - 6:00					
				Non-Trucks		All Trucks		All Vehicles		Non-Trucks		All Trucks		All Vehicles	
				Class 1-4		Class 5-13		Class 1-13		Class 1-4		Class 5-13		Class 1-13	
			Count Date	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct
20	EASTERN AVE,	EAST	03/30/2004	564	93%	43	7%	607	100%	1,196	96%	45	4%	1,241	100%
	W of Dundalk Ave	WEST	03/30/2004	1,022	95%	56	5%	1,078	100%	798	96%	34	4%	832	100%
21	KEY HIGHWAY,	NORTH	11/30/2004	448	88%	62	12%	509	100%	329	83%	66	17%	395	100%
	Bet. McComas/Light	SOUTH	11/30/2004	411	86%	67	14%	478	100%	455	88%	60	12%	515	100%
22	CHESAPEAKE AVE,	EAST	11/10/2004	23	49%	24	51%	46	100%	39	78%	11	22%	50	100%
	Bet. Shell/Vera	WEST	11/10/2004	43	65%	24	35%	67	100%	13	45%	16	55%	29	100%
23	MD 151, SPW PT	EAST	12/04/2001	91	83%	18	17%	109	100%	116	97%	3	3%	119	100%
	W of Wharf	WEST	12/04/2001	232	94%	15	6%	247	100%	34	88%	5	12%	38	100%
24	MD 158, Between	NORTH	08/26/2004	19	66%	10	34%	28	100%	60	78%	17	22%	76	100%
	MD 157 & Tin Mill Rd	SOUTH	08/26/2004	39	75%	13	25%	51	100%	22	90%	3	10%	25	100%
25	VERA ST,	NORTH	08/20/2003	11	53%	10	48%	20	100%	7	74%	3	26%	10	100%
	N of Chesapeake Ave	SOUTH	08/20/2003	15	69%	7	31%	21	100%	11	73%	4	27%	15	100%
26	ANDRE ST,	NORTH	07/16/2003	47	92%	4	8%	51	100%	47	95%	3	5%	50	100%
	N of Fort Ave	SOUTH	07/16/2003	74	93%	6	7%	79	100%	95	95%	6	5%	101	100%
27	O'DONNELL CUTOFF,	EAST	10/25/2000	370	98%	8	2%	378	100%	393	98%	9	2%	401	100%
	E of Interstate Ave	WEST	10/25/2000	283	95%	14	5%	296	100%	444	97%	14	3%	458	100%
28	PONCA ST,	NORTH	07/17/2001	155	94%	11	6%	166	100%	139	99%	2	1%	141	100%
	S of O'Donnell	SOUTH	07/17/2001	203	91%	20	9%	223	100%	164	94%	11	6%	175	100%

Table F1. Vehicle Classifications Summary, AM and PM Peak Hour (continued)

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary			AM PEAK HOUR 7:00 - 8:00						PM PEAK HOUR 5:00 - 6:00					
			Non-Trucks		All Trucks		All Vehicles		Non-Trucks		All Trucks		All Vehicles	
			Class 1-4		Class 5-13		Class 1-13		Class 1-4		Class 5-13		Class 1-13	
		Count Date	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct	Veh	Pct
29 PONCA ST, S of Lombard	2-WAY	06/21/2001	341	86%	54	14%	395	100%	508	91%	52	9%	559	100%

Table F2. Vehicle Classifications Summary, ADT

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary			ADT					
			Non-Trucks		All Trucks		All Vehicles	
			Class 1-4		Class 5-13		Class 1-13	
			Veh	Pct	Veh	Pct	Veh	Pct
1	MCCOMAS, E of Hanover St	EAST WEST	1,563 3,047	91% 89%	163 384	9% 11%	1,725 3,430	100% 100%
2	FORT AVE E of Hull Street	EAST WEST	2,302 2,426	92% 95%	187 122	8% 5%	2,489 2,548	100% 100%
4	HOLABIRD, W of Broening	EAST WEST	7,801 7,340	81% 83%	1,803 1,456	19% 17%	9,604 8,796	100% 100%
5	KEITH, S of Clinton St	NORTH SOUTH	6,449 3,914	86% 81%	1,035 934	14% 19%	7,484 4,847	100% 100%
6	DUNDALK, N of Holabird St	NORTH SOUTH	12,358 11,062	93% 92%	861 965	7% 8%	13,218 12,027	100% 100%
7	BROENING, S of Holabird	NORTH SOUTH	3,265 4,097	73% 80%	1,185 1,054	27% 20%	4,450 5,150	100% 100%
8	HANOVER POTEE, S Waterview	NORTH SOUTH	8,471 11,764	79% 85%	2,319 2,115	21% 15%	10,790 13,879	100% 100%
9	PATAPSCO E of Hanover	EAST WEST	6,205 3,347	81% 86%	1,482 540	19% 14%	7,687 3,887	100% 100%
10	PENNINGTON, S of Aspen	2-WAY	10,717	83%	2,149	17%	12,865	100%
11	SHELL RD, S of Frankfurst	NORTH SOUTH	1,170 2,974	61% 77%	757 908	39% 23%	1,927 3,882	100% 100%
12	FRANKFURST W of Childs	2-WAY	4,899	73%	1,800	27%	6,698	100%
13	CHILDS, N of Frankfurst	NORTH SOUTH	676 624	89% 87%	86 92	11% 13%	762 715	100% 100%
14	CHEMICAL RD, N of Hawkins Point Rd	NORTH SOUTH	866 985	78% 78%	251 276	22% 22%	1,116 1,261	100% 100%

Table F2. Vehicle Classifications Summary, ADT (continued)

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary			ADT					
			Non-Trucks		All Trucks		All Vehicles	
			Class 1-4		Class 5-13		Class 1-13	
			Veh	Pct	Veh	Pct	Veh	Pct
15	QUARANTINE RD,	NORTH	5,435	76%	1,693	24%	7,128	100%
	N of Hawkins Point	SOUTH	3,070	76%	977	24%	4,046	100%
16	GOV RITCHIE HWY,	NORTH	9,088	96%	406	4%	9,494	100%
	S of Patapasco	SOUTH	12,199	96%	484	4%	12,682	100%
17	HAWKINS POINT RD	EAST	4,318	78%	1,210	22%	5,528	100%
	Chem Rd to Quar	WEST	3,894	78%	1,094	22%	4,988	100%
18	HANOVER ST,	2-WAY	27,604	82%	6,119	18%	33,723	100%
	N of Cromwell							
19	BOSTON ST,	EAST	6,891	90%	757	10%	7,647	100%
	W of Ponca	WEST	6,671	90%	762	10%	7,432	100%
20	EASTERN AVE,	EAST	13,393	94%	840	6%	14,233	100%
	W of Dundalk Ave	WEST	13,131	93%	967	7%	14,097	100%
21	KEY HIGHWAY,	NORTH	5,532	84%	1,085	16%	6,617	100%
	Bet. McComas/Light	SOUTH	6,289	85%	1,093	15%	7,382	100%
22	CHESAPEAKE AVE,	EAST	730	62%	440	38%	1,169	100%
	Bet. Shell/Vera	WEST	508	51%	493	49%	1,001	100%
23	MD 151, SPW PT	EAST	2,471	94%	170	6%	2,641	100%
	W of Wharf	WEST	2,480	92%	217	8%	2,697	100%
24	MD 158, Between	NORTH	821	80%	209	20%	1,030	100%
	MD 157 & Tin Mill Rd	SOUTH	762	85%	133	15%	895	100%
25	VERA ST,	NORTH	195	61%	124	39%	319	100%
	N of Chesapeake Ave	SOUTH	261	68%	124	32%	384	100%
26	ANDRE ST,	NORTH	637	92%	59	8%	696	100%
	N ofFort Ave	SOUTH	978	92%	83	8%	1,061	100%
27	O'DONNELL CUTOFF,	EAST	5,461	97%	171	3%	5,632	100%
	E of Interstate Ave	WEST	5,325	97%	178	3%	5,503	100%

Table F2. Vehicle Classifications Summary, ADT (continued)

MDDOT Port of Baltimore Access Study Vehicle Classifications Summary			ADT					
			Non-Trucks		All Trucks		All Vehicles	
			Class 1-4		Class 5-13		Class 1-13	
			Veh	Pct	Veh	Pct	Veh	Pct
28	PONCA ST, S of O'Donnell	NORTH	2,161	93%	164	7%	2,325	100%
		SOUTH	2,624	90%	292	10%	2,915	100%
29	PONCA ST, S of Lombard	2-WAY	11,751	90%	1,369	10%	13,120	100%

Table F3. Vehicle Classification Scheme

Using FHWA's vehicle classifications, as listed below, thirteen categories of vehicles were summarized. Categories 1 – 4 are classified as passenger vehicles, while categories 5 – 13 are classified as trucks.

Passenger Vehicles

1. Motorcycles
2. Passenger Cars
3. Other Two-Axle, Four-Tire Single Unit Vehicles (i.e., pickup trucks, vans)
4. Buses

Trucks

5. Two-Axle, Six-Tire, Single Unit Trucks
6. Three-Axle Single Unit Trucks
7. Four or More Axle Single Unit Trucks
8. Four or Less Axle Single Trailer Trucks
9. Five-Axle Single Trailer Trucks
10. Six or More Axle Multi-Trailer Trucks
11. Five or Less Axle Multi-Trailer Trucks
12. Six-Axle Multi-Trailer Trucks
13. Seven or More Axle Multi-Trailer Trucks

Figure F1. Hourly Volumes for Inbound Trucks at Terminals Counted

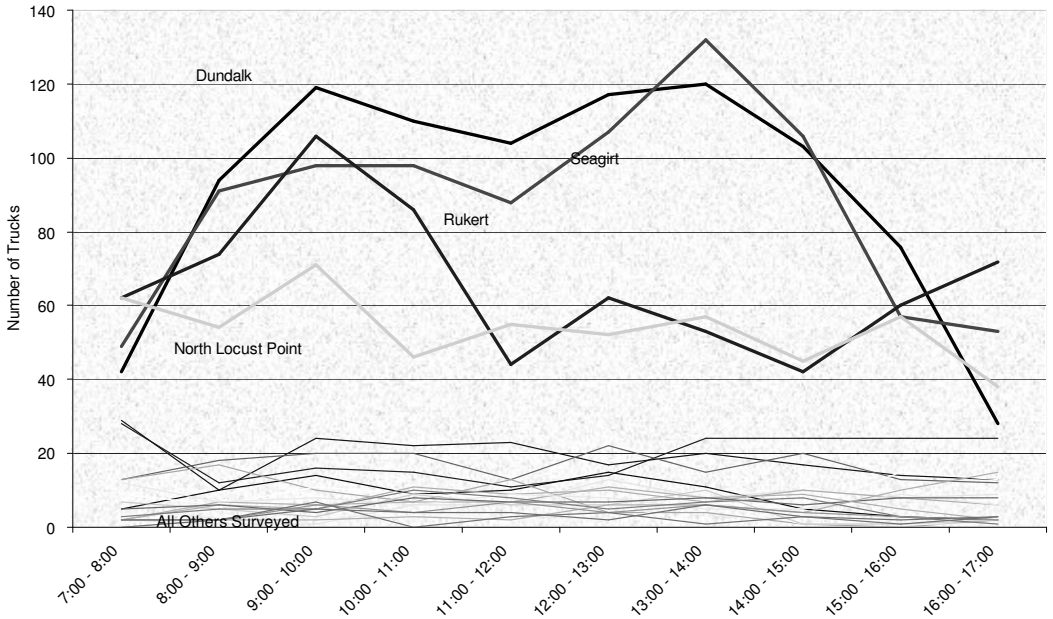


Figure F2. Hourly Volumes for Outbound Trucks at Terminals Counted

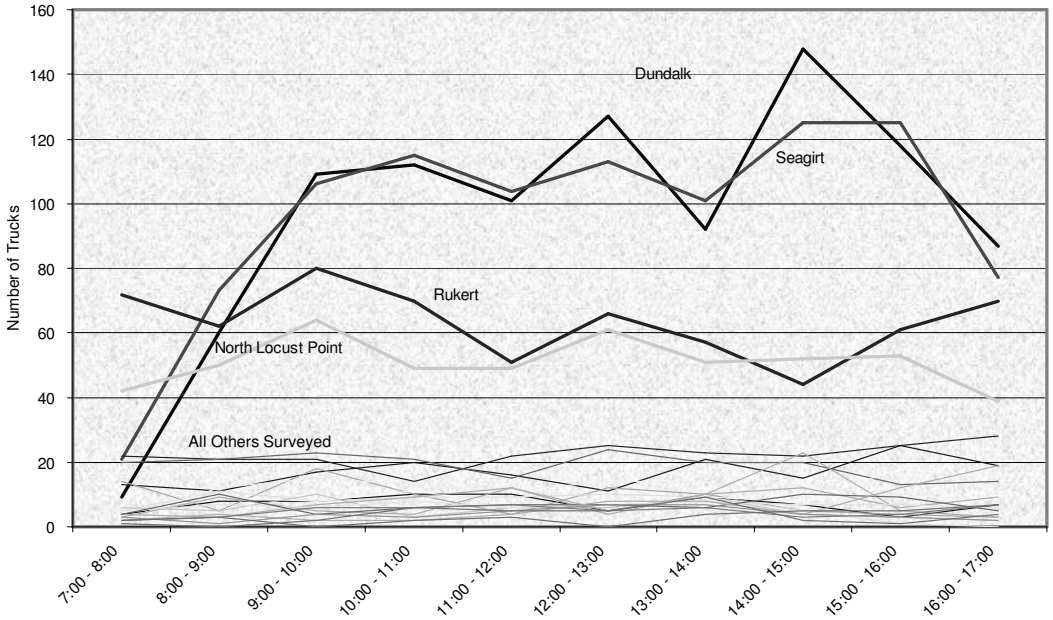


Table F4. Peak Hour Trucks for Port of Baltimore Terminals

	AM Peak Hr		Daily		PM Peak Hr		Daily
Location	**Starting Time**	**Vehicles**	**Vehicles**	**Location**	**Starting Time**	**Vehicles**	**Vehicles**
Beth Steel Gate C	07:00	39	264*	North Locust Point	12:00	113	1047
Hess Entrance	07:15	50	415	National Gypsum	12:00	46	357
Norfolk Southern	07:15	17	142	Beth Steel Gate C	12:00	17	264*
Lehigh Cement	08:00	16	135	Fairfield	12:45	14	61
WR Grace	08:00	13	153*	US Coast Guard	13:00	14	79
North Locust Point	09:00	135	1047	Seagirt	13:00	277	1839
Fairfield	09:15	9	61	Dundalk	13:00	272	1876
Rukert	09:15	186	1294	US Gypsum	13:00	20	276*
Dundalk	09:45	248	1876	Beth Steel Wharf Roa	13:00	23	206*
National Gypsum	09:45	50	357	ICTF	13:30	46	357
Baltimore Maritime	10:00	18	203*	South Locust Point	13:45	36	143
Masonville	10:00	16	104	Masonville	13:45	16	104
Seagirt	10:00	216	1839	Belts	14:00	24	150
US Gypsum	10:00	22	276*	Baltimore Maritime	14:00	21	203*
Domino Sugar	10:30	22	183	WR Grace	14:00	19	153*
Atlantic	10:45	7	62	Lehigh Cement	14:30	18	135
Belts	10:45	26	150	Norfolk Southern	15:15	16	142
ICTF	10:45	45	357	Domino Sugar	15:15	33	183
US Coast Guard	10:45	13	79	Atlantic	15:45	14	62
Beth Steel Wharf Roa	11:00	15	206*	Rukert	16:15	142	1294
Chesapeake	11:00	7	117	Hess Entrance	16:15	52	415
South Locust Point	11:00	20	143	Chesapeake	16:15	34	117

All daily vehicle counts were performed manually between 7:00 AM and 5:00 PM except where noted by an asterisk.

* indicates 24 hour machine count.

Table F5. Traffic Volumes and Levels of Service on Local Port Access Roads by Time Period

Terminal Area / Intersection	AM Peak Hour						PM Peak Hour					
	Total Approach Volumes	Methodology: SHA Critical Lane LOS	V/C	CL Vol.	HCS Planning LOS	V/C	Total Approach Volumes	Methodology: SHA Critical Lane LOS	V/C	CL Vol.	HCS Planning LOS	V/C
Sparrows Point												
MD 158 at Wharf Rd	964	A	0.33	523	Under	0.52	849	A	0.32	516	Under	0.60
Dundalk / Seagirt / Canton South												
Dundalk at Holabird	2,675	A	0.49	780	Under	0.52	3,462	B	0.65	1,032	Near	0.94
Holabird at Broening	1,961	A	0.35	558	Under	0.33	1,964	A	0.46	729	Under	0.39
Highlandtown												
Eastern at Kane	2,238	A	0.43	685	Under	0.64	2,594	A	0.51	852	Under	0.76
Canton												
Clinton at Boston	1,657	A	0.36	580	Under	0.35	1,956	A	0.45	721	Under	0.50
Boston at Ponca	2,151	A	0.56	900	Under	0.56	1,939	A	0.51	819	Under	0.47
Boston at O'Donnell Cutoff/Interstate	1,410	A	0.39	631	Under	0.27	1,873	A	0.49	784	Under	0.45
O'Donnell at Ponca	1,954	A	0.45	726	Under	0.41	2,095	A	0.43	691	Under	0.41
O'Donnell at O'Donnell Cutoff	1,883	A	0.49	780	Under	0.64	1,978	A	0.43	691	Under	0.59
O'Donnell at Interstate Ave	1,882	A	0.56	900	Near	0.85	2,231	B	0.69	1,106	Over	1.13
Locust Point												
McComas at Key Hwy (location 1)	818	A	0.17	269	Under	0.38	1799	A	0.17	275	Under	0.48
McComas at Key Hwy (location 2)	1,798	A	0.47	744	Under	0.64	1915	A	0.50	801	Under	0.61
Fort Ave at Hanover	1,112	A	0.54	861	Under	0.64	1532	A	0.74	1180		0.89
Fort Ave at Lawrence	1,495	A	0.50	792	Under	0.56	1596	A	0.47	759	Under	0.50
Key Hwy at Key Hwy East	2,057	A	0.51	808	Over	1.00	2020	A	0.45	716	Under	0.77
Key Hwy at Lawrence	1,861	A	0.48	774	Under	0.73	2,262	A	0.57	914	Near	0.90
Fairfield												
Waterview at Hanover	1,734	A	0.48	767	Under	0.61	1,432	A	0.38	602	Under	0.49
Waterview at Potee	1,040	A	0.23	363	Under	0.27	1,675	A	0.34	547	Under	0.37
Hanover at Patapsco	1,535	A	0.57	905	Under	0.52	1,580	A	0.61	973	Under	0.59
Chesapeake at Shell	518	A	0.22	353	Under	0.16	441	A	0.20	327	Under	0.2
Childs at Frankfurst	575	A	0.14	229	Under	0.12	491	A	0.11	182	Under	0.16
Shell at Frankfurst	385	A	0.10	163	Under	0	617	A	0.16	260	Under	0
Curtis Bay / Hawkins Point												
Pennington at Ordinance	1,446	A	0.34	539	Under	0.80	1,627	A	0.45	720	Near	0.86
Chemical at Hawkins Point Rd	1,120	A	0.30	478	Under	0.32	1,171	A	0.32	504	Under	0.36
Quarantine at Hawkins Point Rd	2,575	C	0.75	1,202	Over	1.05	1,873	B	0.69	1,098	Over	1.00
Quarantine at WB Ramp	1,504	D	0.85	1,365	Over	1.06	1,002	A	0.59	945	Near	0.88
Quarantine at EB Ramp	1,938	A	0.34	540	Under	0.75	1,835	A	0.30	485	Near	0.90

Table F6. AM Peak Levels of Service for I-95 Northbound from South of Caton Ave to South of I-895

		Mainline Section	Volume (veh/hr)	# Lns	Vol/Ln (veh/Ln)	Truck (%)	LOS	Flow Rate (pc/hr/ln)
1	I-95 NB	S of Caton Ave	8,054	4	2,014	8%	E	2,327
2	I-95 NB	S of Wash Blvd	6,965	4	1,741	8%	D	2,012
3	I-95 NB	N of Wash Blvd	7,082	4	1,771	10%	D	2,066
4	I-95 NB	N of I-395	4,154	4	1,039	11%	B	1,216
5	I-95 NB	S of Harbor Tunnel	3,415	4	854	11%	B	1,001
6	I-95 NB	S of Bost/Odon	3,337	4	834	12%	B	983
7	I-95 NB	N of Bost/Odon	3,393	4	848	11%	B	994
8	I-95 NB	N of Dundalk	3,314	4	829	12%	B	976
9	I-95 NB	N of Eastern Ave	3,421	4	855	11%	B	1,003
10	I-95 NB	N of Moravia	2,931	4	733	12%	B	863
11	I-95 NB	S of I-895	2,611	3	870	13%	B	1,030

Table F7. AM Peak Levels of Service for I-95 Southbound from South of Caton Ave to South of I-895

		Mainline Section	Volume (veh/hr)	# Lns	Vol/Ln (veh/Ln)	Truck (%)	LOS	Flow Rate (pc/hr/ln)
1	I-95 SB	S of Caton Ave	6,965	4	1,741	8%	D	2,012
2	I-95 SB	S of Wash Blvd	6,787	4	1,697	8%	D	1,961
3	I-95 SB	N of Wash Blvd	6,957	4	1,739	8%	D	2,010
4	I-95 SB	N of I-395	7,376	4	1,844	10%	E	2,151
5	I-95 SB	S of Harbor Tunnel	3,415	4	854	11%	B	1,001
6	I-95 SB	S of Bost/Odon	7,085	4	1,771	17%	D	2,135
7	I-95 SB	N of Bost/Odon	7,143	4	1,786	16%	D	2,143
8	I-95 SB	N of Dundalk	6,705	4	1,676	16%	D	2,011
9	I-95 SB	N of Eastern Ave	6,739	4	1,685	14%	D	2,003
10	I-95 SB	N of Moravia	5,911	4	1,478	16%	D	1,773
11	I-95 SB	S of I-895	5,284	3	1,761	17%	D	2,123

Appendix G

Truck Survey Form

Port of Baltimore Truck Access Survey

The purpose of this survey is to assess future transportation needs for the Port of Baltimore. Please take a few minutes to complete these questions. Your responses are anonymous and your input is greatly appreciated.

Please return the survey at the terminal exit gate to be entered for

three CASH RAFFLE PRIZES worth up to $250.

PART I. Questions regarding your trip TO the Port of Baltimore

1. What was your last stop point prior to the Port?

If in town - intersection or address: _____

If out of town - name of city/town and state: _____

2. What type of facility was it?

___Shipper/Receiver ___Warehouse/Distribution ___Rail yard ___Factory

___Air Terminal ___Point of Sale ___Farm ___Other

3. What route did you take to get here?

State and Regional Highways:_____

Local Streets:_____

4. Did you arrive loaded or empty? _____Loaded _____Empty

If loaded, are you carrying hazardous materials? _____YES _____NO

Did your entire load come from your last stop? _____YES _____NO

PART II. Questions regarding your trip FROM the Port of Baltimore

5. What will be your next stop point after leaving the Port?

If in town - intersection or address:_____

If out of town - name of city/town and state: _____

6. What type of facility will this be?

___Shipper/Receiver ___Warehouse/Distribution ___ Rail yard ___Factory

___Air Terminal ___Point of Sale ___Farm ___Other

7. What route will you take to get there?

Local Streets:_____

State and Regional Highways:_____

Please continue on reverse

8. Are you leaving loaded or empty? _____Loaded _____Empty

If loaded, are you carrying hazardous materials? _____YES _____NO

Will all of your load go to your next stop? _____YES _____NO

PART III. GENERAL QUESTIONS

9. How frequently do you make this trip? (Please fill in a number)

_____ times Daily _____times Weekly _____ times Monthly _____Other

10. Are you an: _____Owner-operator_____Contract driver _____Other

11. Did you plan your route today to avoid or minimize tolls? _____YES _____NO

12. Are tolls paid or reimbursed by your company? _____YES _____NO

13. If hazmat (___) or oversized (___), did you encounter any routing problems?

_____ YES _____NO If YES, where

_____

14. Did you or will you encounter specific traffic problems on your routes today, other than construction or accident/incident delays?

_____YES _____NO If YES, where

Local Streets:_____

State and Regional Highways:_____

15. Do you need more information on traffic conditions and/or truck restrictions to help you plan your route and time of travel?

_____YES _____NO

If yes, what type of information would be most helpful?

_____ Internet _____ Radio _____ Variable Message/Freeway Sign _____ Other

16. Can you think of any roadway improvements that would help make your trip faster, safer, and/or more reliable?

_____

_____

Thank you for your time. Please return to survey administrator at exit gate and receive a raffle ticket.

Appendix H

Truck Survey Results

H.1. Results for Survey Sample #1, Seagirt and Dundalk

Written surveys were administered to truckers entering the Seagirt and Dundalk terminals on a weekday between the hours of 7:00 AM and 5:00 PM. In addition to the general findings summarized in the body of the Report, we can make the following additional observations:

- By a slight margin, most respondents indicated their travel begins or ends outside Baltimore City. Roughly 60% inbound began outside of the City, with roughly the same amount outbound.

- Most non-local inbound travel comes from Maryland and Pennsylvania. When asked about the last stop prior to arriving at the POB, operators identified York, Carlisle, Harrisburg and Philadelphia as the top Pennsylvania origins, and Jessup and Hanover as the top Maryland origins. Outbound, Pennsylvania and Maryland overwhelmingly headed the list of non-local destinations. York, PA, Jessup, MD, Elkridge, MD, Hanover, PA and Carlisle, PA were the most frequently-cited destinations. Non-local destinations are more scattered than origins.

- Of the 155 respondents indicating that their last stop before entering the terminal was in the City of Baltimore, about 1/3 came from the general POB area, with the remainder scattered throughout the city. Top local origins include 68th Street (11), Hollins Ferry Road (8), Clinton Street (7), Boston Street (6), Grays Rd. (6) and Newkirk Street (6).

- Nearly half of all operators arrive from warehouse/distribution centers. Additionally, twenty-five percent of respondents said that their point of origin was a shipping/receiving location, while railroad and factory locations were each mentioned by five percent of respondents. The balance of responses were divided among air terminal, point of sale, farm and other locations. The results for outbound vehicles is very similar to those of inbound vehicles.

- Truckers arrive empty ½ of the time. While travel inbound is evenly divided between full and empty loads, operators depart POB public terminals empty 62% of the time. This reflects the fact that some truckers arrive empty and depart with a load, some arrive with a load and depart empty, etc.

- Operators make several return trips each day. Sixty percent of respondents report that they make one or more daily trips to the public POB terminals, returning, on average, 3.5 times per day. Twenty percent report making trips several times each week basis.

- Key longer-distance travel corridors include: I-95, I-83, and I-70. Key shorter-distance connectors (providing access to other corridors) include 1-95 and I-695/MD 695. Eighty-eight percent of all trips to the Port of Baltimore used I-95, and 45% of

all trips to the Port of Baltimore used both I-95 and I-695/MD 695. Over one-third of all truckers used I-70 or I-83 on their way to I-95 and I-695/MD 695. The results were very similar for travel leaving the Port of Baltimore.

- Most truckers are owner-operators. Fifty-eight percent of truckers report that they own their vehicle, and 20% are contract drivers.

- Most operators (80%) report that they do not encounter significant traffic problems on the road system. Of those reporting traffic problems, the locations they cited most frequently were I-95, I-695/MD 695 and Broening Highway.

- One-third of respondents see value in more traffic information. Of those who responded affirmatively to the need for better traffic information, better radio information and better freeway information systems were cited equally (126 vs. 134). It is likely that the 2/3 of operators who do not desire more or better information either do not want to pay for it, or have sufficient information available to them currently.

Figures H1 through H4 and Table H1 following show proportional breakdowns of survey responses according to key indicators. Note that these represent raw responses, without inflation to represent the effect of operators making multiple trips per day.

Figure H1. Origin (Last Stop) of Inbound Trucks Surveyed, Seagirt and Dundalk (Excluding Baltimore City and Region)

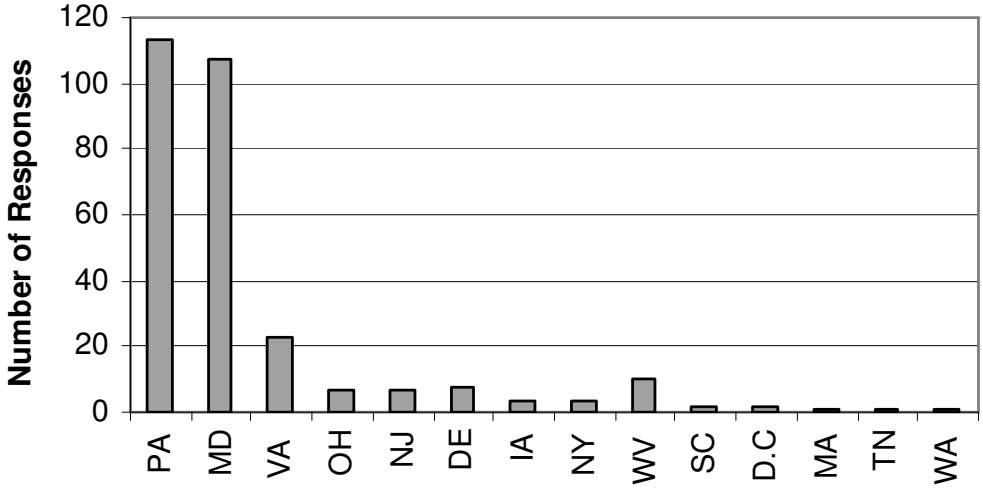


Figure H2. Destination (Next Stop) of Outbound Trucks Surveyed, Seagirt and Dundalk (Excluding Baltimore City and Region)

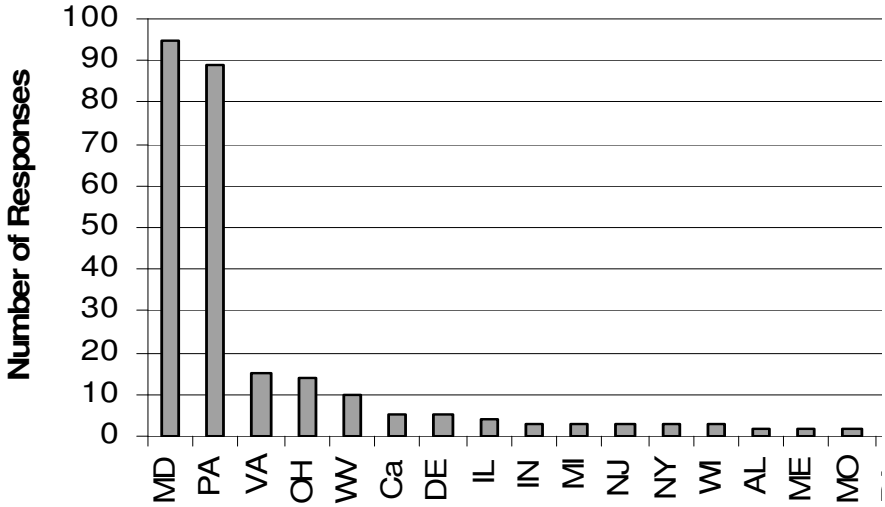


Figure H3. Origin Facility for Inbound Trucks, Seagirt and Dundalk

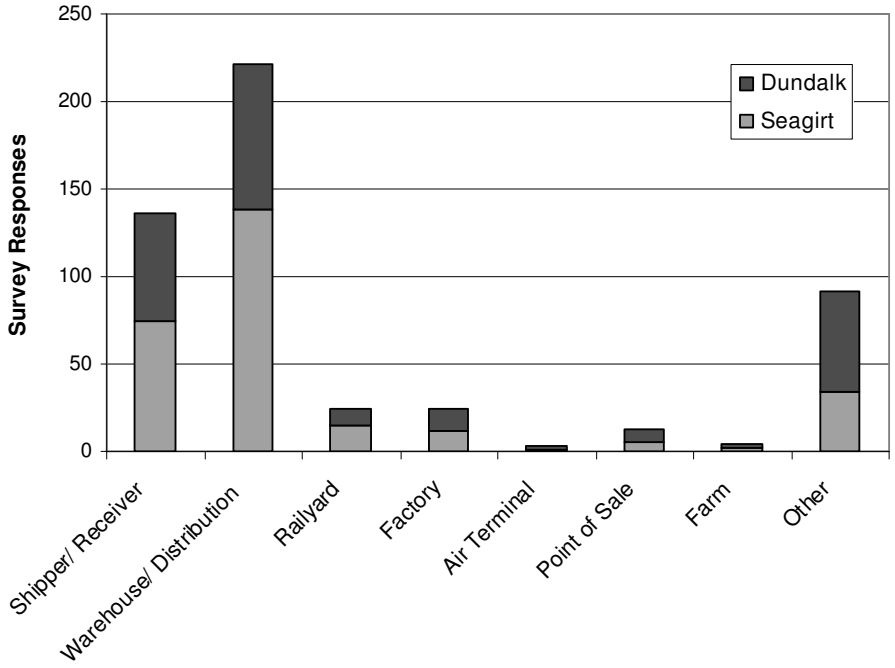


Figure H4. Destination Facility for Outbound Trucks, Seagirt and Dundalk

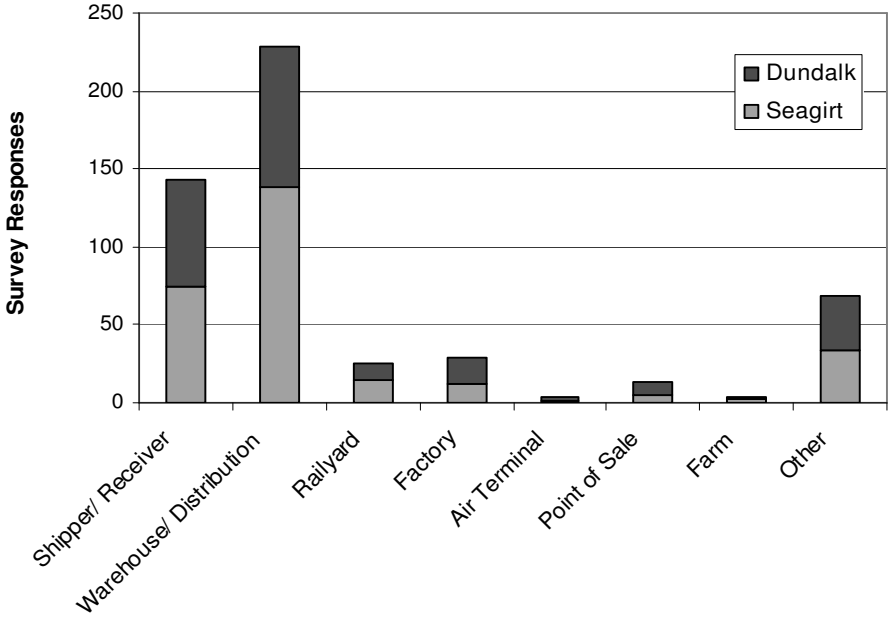


Table H1. Primary and Secondary Travel Routes for Surveyed Trucks, Seagirt and Dundalk

Inbound	385	Percentage	Outbound	367	Percentage
I-95 Total	*340*	88%	*I-95 Total*	309	84%
I-95 Only	77	20%	I-95 Only	53	14%
I-95/695	11	3%	I-95/695	6	2%
I-95/695/70	67	17%	I-95/695/70	69	19%
I-95/695/83	65	17%	I-95/695/83	59	16%
I-95/695/795	10	3%	I-95/695/795	13	4%
I-95/695/97	9	2%	I-95/695/97	2	1%
I-95/695/Other	12	3%	I-95/695/Other	21	6%
I-95/US40/Other	19	5%	I-95/US40/Other	22	6%
I-95/I495/Other	9	2%	I-95/I495/Other	5	1%
I-95/State Routes	36	9%	I-95/State Routes	48	13%
I-95/Other	25	6%	I-95/Other	11	3%
I-695 Total	*25*	6%	*I-695 Total*	34	9%
I-695 Only	9	2%	I-695 Only	9	2%
I-695/I-97/Other	10	3%	I-695/I-97/Other	18	5%
I-695/I-70/Other	4	1%	I-695/I-70/Other	2	1%
I-695/Other	2	1%	I-695/Other	5	1%
MD 157 Total	5	1%	*MD 151 Total*	10	3%
Other Routes	15	4%	*Other Routes*	14	4%

Note: the majority of truckers reporting a Baltimore City/Baltimore Region origin or destination did not provide interstate/state highway routing information. These findings therefore apply primarily to out-of-region travel.

H.2. Results for Survey Sample #2, Rukert / Steinweg / North Locust Point

Written surveys were administered to truckers entering the Seagirt and Dundalk terminals on a weekday between the hours of 7:00 AM and 5:00 PM. In addition to the general findings summarized in the body of the Report, we can make the following additional observations:

- Most truck travel is non-local. Twenty-five of 95 respondents indicated that their last stop prior to reaching the terminals was in the city of Baltimore. Only 7 respondents indicated that their next outbound stop was in the city of Baltimore.

- Most inbound trips to the terminals originate from Maryland. The prior stop of over 45% of trucks inbound trips was in the State of Maryland, with another 28% coming from the Commonwealth of Pennsylvania. New Jersey (7%) and Virginia (9%) were also significant as origins for truckers.

- Outbound, trips tend to be longer distance along the I-95 corridor. The most frequently-cited destination for outbound travel is Pennsylvania, at 26% of all responses. This result resembles the results obtained for the Seagirt and Dundalk terminal surveys and underscores the importance of the port terminals for Pennsylvania businesses. Locations along the I-95 corridor in the Mid-Atlantic or Northeast regions - Maryland, Virginia, New York, New Jersey and New Hampshire– together account for 26% of all responses.

- Trucks are primarily moving to/from shipper locations, warehouses and factories. Together, these locations account for over 74% of inbound terminal trips. Outbound, these facilities are the primary destination of 81% of all trips. Warehouse and distribution centers are the primarily facilities accessed in both inbound and outbound directions.

- Most truckers to these terminals arrive empty and pick up loads for regional delivery. Truckers who stop at the either of the three terminals arrive empty 80%of the time and leave with a full load 92% of the time.

- Operators make relatively few return trips each day/week/month. Only nine percent of respondents report that they make one or more daily trips, returning, on average, 2.6 times per day. Twenty-three percent report making trips several times each week returning, on average, 2.6 times per week. Twenty-four percent report making trips several times each month returning, on average, 2.5 times per month. This is very different from the results for Seagirt and Dundalk, where the majority of truckers are making multiple trips per day and/or per week.

- Key longer-distance travel corridors include: I-95, I-83, and I-70. Key shorter-distance connectors include: 1-95, I-695 and MD 695. Ninety-eight percent of all inbound trips reached POB via I-95, while 57% of all trips used both I-95 and I-695. These routes are traveled from I-70 or I-83 by 54% of all truckers. The results were very similar for outbound travel, as shown in Table 10 following, with 96 % of all outbound trips using I-95, and 50 % of all outbound trips using both I-95 and I-695 (47 % through I-70 or I-83).

- Most truckers are contract drivers. 39% of truckers report that they are contract drivers, and 32% own their vehicle.

- Only 15% of respondents report encountering significant traffic problems either from or to the surveyed terminals. Of those reporting traffic problems, the locations they cited most frequently were I-495 and I-695.

- One-fifth of respondents see value in more traffic information. Of those who responded affirmatively to the need for better traffic information, better radio information and better freeway information systems were cited equally (24 each). It is likely that the 2/3 of operators who do not desire more or better information either do not see the value in it, or have sufficient information available to them currently.

Figure H5. Origin (Last Stop) of Inbound Trucks Surveyed, Steinweg/ Rukert/North Locust Point (Excluding Baltimore City/Region)

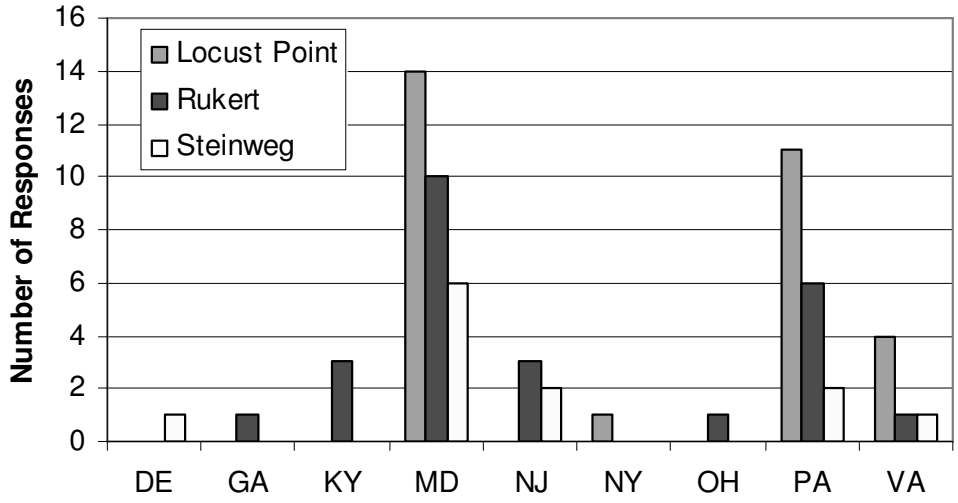


Figure H6. Destination (Next Stop) of Outbound Trucks Surveyed, Steinweg/ Rukert/North Locust Point (Excluding Baltimore City/Region)

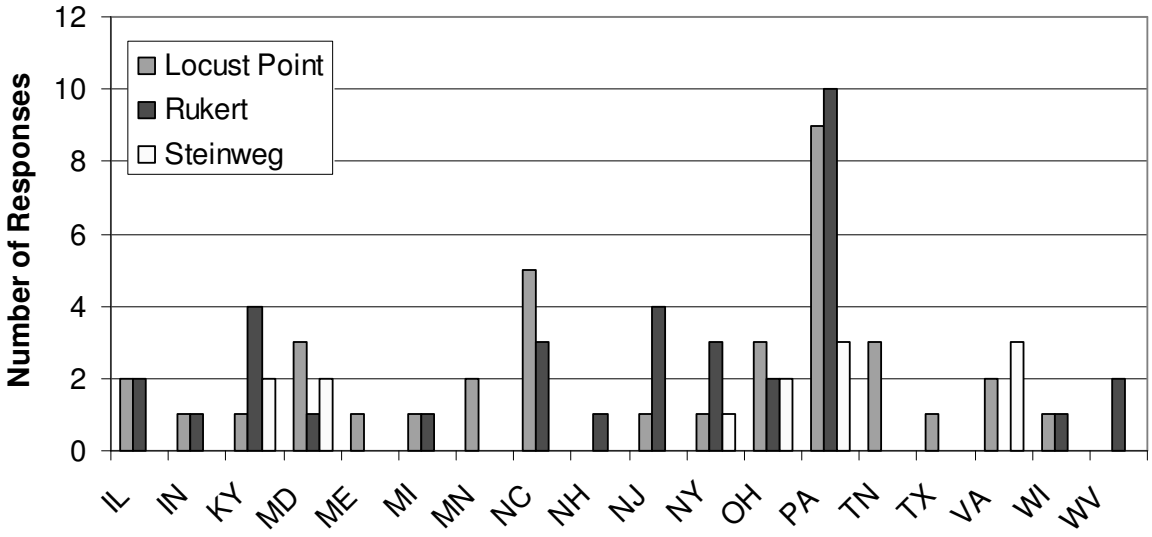


Figure H7. Origin Facility for Inbound Trucks Surveyed, Steinweg/Rukert/ North Locust Point

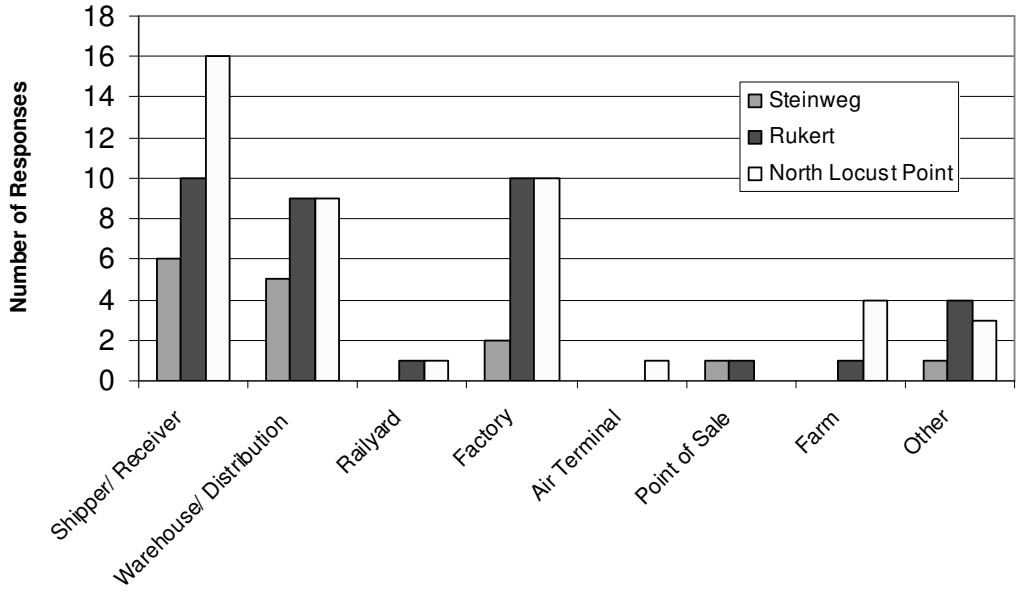


Figure H8. Destination Facility Type of Outbound Trucks Surveyed, Steinweg/Rukert/North Locust Point

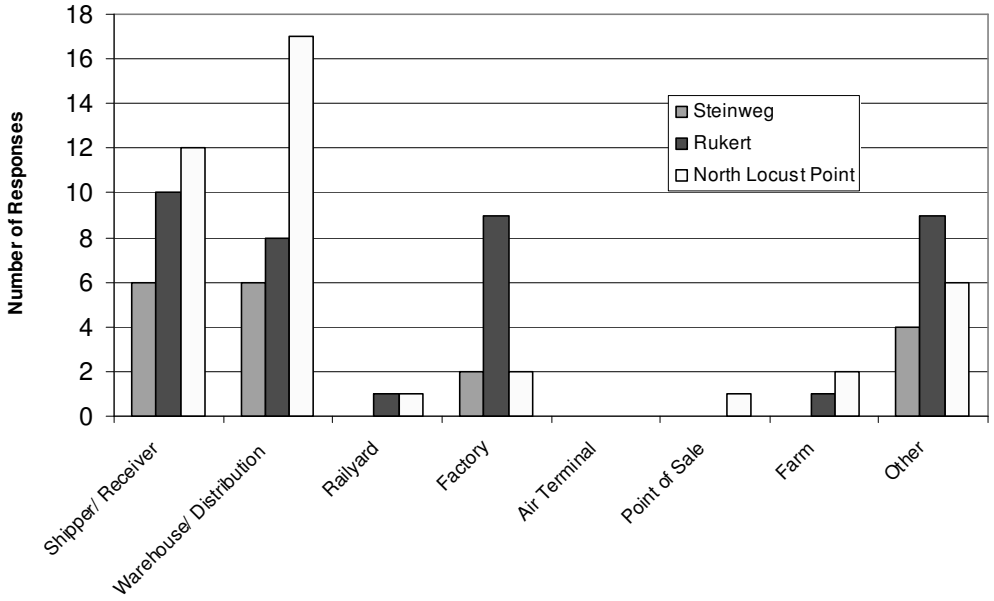


Table H2. Primary and Secondary Travel Routes for Surveyed Trucks, Steinweg/Rukert/North Locust Point

Inbound	92	Percentage	Outbound	92	Percentage
I-95 Total	90		*I-95 Total*	88	
I-95 Only	13	14%	I-95 Only	18	20%
I-95/695	1	1%	I-95/695	1	1%
I-95/695/70	32	35%	I-95/695/70	27	31%
I-95/695/83	18	20%	I-95/695/83	16	18%
I-95/695/795	-	0%	I-95/695/795	-	0%
I-95/695/97	1	1%	I-95/695/97	2	2%
I-95/695/Other	-	0%	I-95/695/Other	-	0%
I-95/US40/Other	1	1%	I-95/US40/Other	2	2%
I-95/I495/Other	8	9%	I-95/I495/Other	7	8%
I-95/State Routes	6	7%	I-95/State Routes	9	10%
I-95/Other	10	11%	I-95/Other	6	7%
I-695 Total	-		*I-695 Total*	2	
I-695 Only	-	0%	I-695 Only	1	50%
I-695/I-97/Other	-	0%	I-695/I-97/Other	-	0%
I-695/I-70/Other	-	0%	I-695/I-70/Other	-	0%
I-695/Other	-	0%	I-695/Other	1	50%
I-83	2	100%	*I-83*	2	100%
Other Routes	-	0%	*Other Routes*	-	0%

Note: the majority of truckers reporting a Baltimore City/Baltimore Region origin or destination did not provide interstate/state highway routing information. These findings therefore apply primarily to out-of-region travel.

Appendix I

Future Level of Service Analysis

Table I1. Forecast Intersection Levels of Service for Primary Port of Baltimore Access Routes

	AM Peak 2025 Conditions						
Intersection	**LOS**	**v/c ratio**	**CL Vol**	**Total Vol**	**Total Lanes**	**Vol per Lane**	**% Change**
McComas at Key Hwy (location 1)	A	0.05	83	1,207	6	201	48%
McComas at Key Hwy (location 2)	A	0.54	869	2,414	6	402	34%
Key Hwy at Key Hwy East	B	0.63	1,014	2,650	10	265	29%
Key Hwy at Lawrence	B	0.68	1,082	2,637	8	330	42%
Fort Ave at Lawrence	B	0.72	1,146	2,125	9	236	42%
Fort Ave at Hanover	B	0.69	1,101	1,417	4	354	27%
O'Donnell at Ponca	A	0.32	516	1,296	10	130	-34%
Boston at Ponca	**F**	**1.05**	**1,681**	**3,515**	**11**	**320**	**63%**
Boston at O'Donnell Cutoff	A	0.49	779	1,858	11	169	32%
O'Donnell at O'Donnell Cutoff	A	0.37	591	1,812	6	302	-4%
O'Donnell at Interstate Ave	A	0.41	650	1,447	10	145	-23%
Clinton at Boston	A	0.61	981	2,981	8	373	80%
Dundalk at Holabird	A	0.48	760	2,589	14	185	-3%
Holabird at Broening	A	0.35	560	1,958	15	131	0%
Eastern at Kane	A	0.45	719	2,289	12	191	2%
Waterview at Hanover	A	0.55	885	2,028	6	338	17%
Waterview at Potee	A	0.27	434	1,288	7	184	24%
Hanover at Patapsco	B	0.69	1,101	1,816	6	303	18%
Chesapeake at Shell	A	0.22	356	514	5	103	-1%
Childs at Frankfurst	A	0.15	232	570	7	81	-1%
Shell at Frankfurst	A	0.11	170	409	8	51	6%
Chemical at Hawkins Point Rd	A	0.40	640	1,420	6	237	27%
Quarantine at Hawkins Point Rd	E	0.91	1,451	3,053	12	254	19%
Pennington at Ordinance	A	0.39	630	1,731	9	192	20%
Quarantine at WB Ramp	**E**	**0.91**	**1,455**	**1,602**	**6**	**267**	**7%**
Quarantine at EB Ramp	A	0.42	675	2,397	6	400	24%
MD 158 at Wharf Rd	A	0.37	598	1,178	4	295	22%

Key:
LOS – Level of Service
V/C ratio – Roadway volume to capacity ratio
CL Volume – Critical lane volume
Total Vol – Total hourly approach volume
Vol per lane – Peak hour volume per lane

Note:
Intersections shown in bold face type are projected to operate at poor LOS, but should benefit from planned improvements which may not be reflected in the BRTB model network used for this analysis.